Service
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Service Manual

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Specification:

Video recording system:	Rotary 2-head helical scan system
Antenna input Signal:	PAL BG DK I SECAM K1
Antenna:	VHF/UHF 75Ω external antenna terminal
Video Output Channel:	UHF 36 (Adjustable CH28-CH60)
	75Ω unbalanced
Power requirement:	AC 110V – 240V, ~ 50/60Hz
Power consumption:	18W
Operating temperature:	+41°F (5°C) to 104°F (40°C) *
Relative humidity:	10% to 80%
Weight:	3.2kg
Dimensions:	360 x 94.5 x 281mm

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

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PHILIPS

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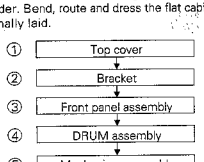
SECTION 1
DISASSEMBLY

1.1 DISASSEMBLY FLOW CHART

This flowchart lists the disassembling steps for the cabinet parts and P.C. boards in order to gain access to item(s) to be serviced. When reassembling, perform the step(s) in reverse order. Bend, route and dress the flat cables as they were originally laid.



1.2 HOW TO READ THE DISASSEMBLY AND ASSEMBLY

STEP /LOC NO.	PART NAME	FIG. NO.	POINT	NOTE
①	TOP COVER	D1	3(S1)	
②	BRACKET	D2	2(S2)	
③	FRONT PANEL ASSEMBLY	D3	7(L1)	<NOTE 1> <NOTE 2>
④	DRUM ASSEMBLY	D4	2(S3)(VR399/55), 3(S4), (L2), WR1, WR2, *CN1, CLEANER ASSEMBLY, DRUM SHIELD (VR399/55)	<NOTE 3>
⑤	MECHANISM ASSEMBLY	D5	2(S5),2(S6),2(L3), WR3, *CN1	<NOTE 3> <NOTE 4>
⑥	MAIN BOARD ASSEMBLY	D6	(S6), 6(L4)(VR399/55), 3(L4)(VR299/55)	

(1) (2) (3) (4) (5)

(1) Order of steps in Procedure
When reassembling, perform the step(s) in the reverse order. These numbers are also used as the identification (location) NO. of parts Figures.
(2) Part name to be removed or installed.
(3) Fig.No. showing procedure or part location
(4) Identification of part to be removed,unhooked,unlocked, released,unpluged,unclamped or unsoldered. P = Spring, W = Washer, S = Screw, L = Locking tab, * = Unhook,unlock, release,unplug or unsolder.
(5) Adjustment information for installation

1.3 DISASSEMBLY/ASSEMBLY METHOD

STEP /LOC NO.	PART NAME	FIG. NO.	POINT	NOTE
①	TOP COVER	D1	3(S1)	
②	BRACKET	D2	2(S2)	
③	FRONT PANEL ASSEMBLY	D3	7(L1)	<NOTE 1> <NOTE 2>
④	DRUM ASSEMBLY	D4	2(S3)(VR399/55), 3(S4), (L2), WR1, WR2, *CN1, CLEANER ASSEMBLY, DRUM SHIELD (VR399/55)	<NOTE 3>
⑤	MECHANISM ASSEMBLY	D5	2(S5),2(S6),2(L3), WR3, *CN1	<NOTE 3> <NOTE 4>
⑥	MAIN BOARD ASSEMBLY	D6	(S6), 6(L4)(VR399/55), 3(L4)(VR299/55)	

<NOTE1>
When reattaching the Front panel assembly, make sure that the door opener ⓐ of the Cassette holder assembly is lowered in position prior to the reinstallation.

<NOTE2>
When reattaching the Front panel assembly, pay careful attention to the switch lever not to make it touch the switch knob ⓑ of the Main board assembly from the side.
(If the switch knob of the Main board assembly is damaged, cassette loading is impossible.)

<NOTE3>
When inserting the flat wire into the connector, be careful not to make a mistake in the positioning of its electrodes.

<NOTE4>
- When it is required to remove the screws (S5) retaining the Mechanism assembly, please refer to the 'Procedures for Lowering the Cassette holder assembly'. (See on pages 1-3.)
- When removing the Mechanism assembly only, unhook the two spacers connecting it with the Main board assembly with pliers from the back side of the Main board assembly first, and then remove the Mechanism assembly.
- When reattaching the Mechanism assembly to the Main board assembly, take care not to damage the sensors on the Main board. (D3001: LED, Q3002: Start sensor, Q3003: End sensor)

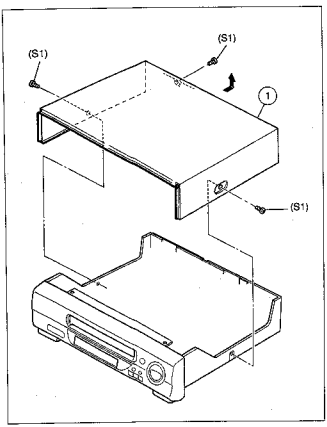


Fig. D1

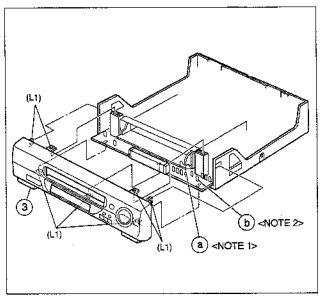


Fig. D3

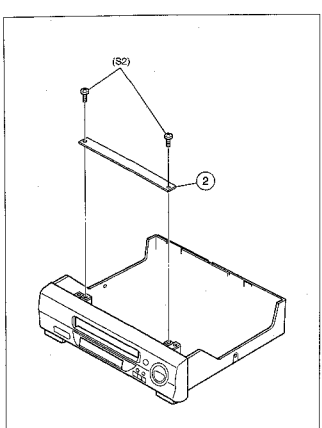


Fig. D2

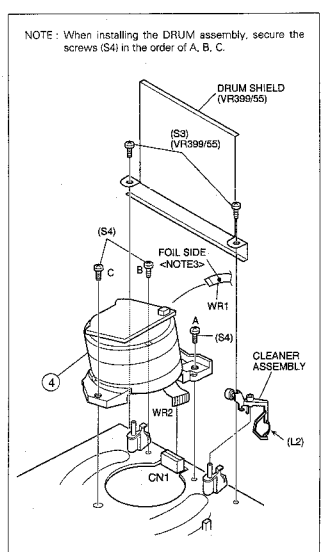


Fig. D4

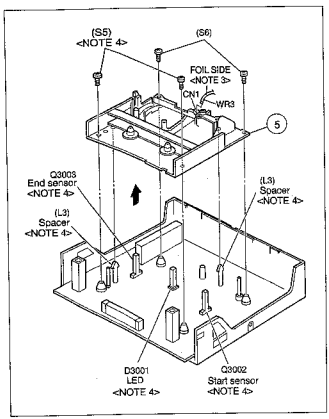


Fig. D5

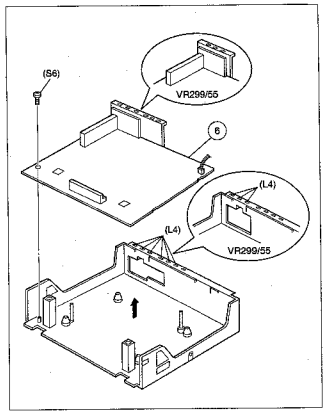


Fig. D6

Procedures for Lowering the Cassette holder assembly

As the mechanism of this unit is integrated with the Housing assembly, the holder must be lowered and the two screws unscrewed when removing the Mechanism assembly.

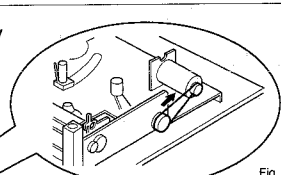


Fig. 2

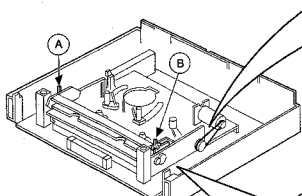


Fig. 1

Turn the loading motor pulley in the direction as indicated by Fig.2. As both Ⓐ and Ⓑ levers are lodged twice, push the levers in the direction as indicated by Fig.3 to release them. When pushing the levers, do it in the order of Ⓐ,Ⓑ,Ⓑ,Ⓐ. When the holder has been lowered, turn the pulley until the cassette holder is securely in place without allowing any up/down movement.

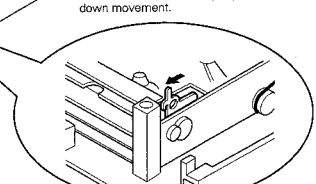


Fig. 3

1.4 SERVICE POSITION

In order to facilitate diagnosis and the repair of the Mechanism assembly, this unit is constructed so as to allow the Mechanism and Main board assemblies to be removed together from the Chassis assembly.

1.4.1 How to take out the Mechanism and Main board assemblies

(1) Remove the Top cover, Bracket and Front panel assembly. (See 1.3 DISASSEMBLY/ASSEMBLY METHOD. Take care not to pull the drum wire (Fig.D4) from CN1.)
(2) Lower the cassette holder, and make the preparations required in order to remove the screws from the Mechanism assembly. (Refer to the "Procedures for Lowering the Cassette holder assembly" on pages 1-3 of 1.3 DISASSEMBLY/ASSEMBLY METHOD.)
(3) Take out 2 screws Ⓐ, 2 screws Ⓑ and 1 screw Ⓒ as shown in Fig. 1-4-1.

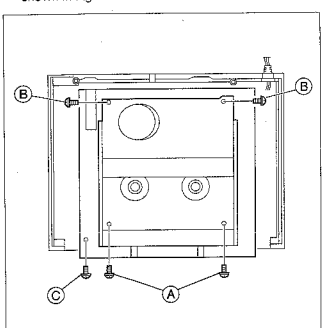


Fig. 1-4-1

(4) Remove the Main board and Mechanism assemblies together while holding the edge of the Main board assembly. At this stage be careful of the power cord and prongs of the jacks on the back side. (See Fig. 1-4-2.)

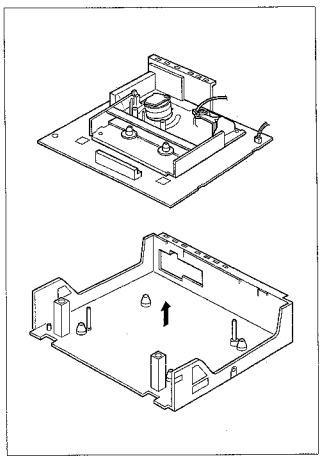


Fig. 1-4-2

(5) Connect the power cord to the isolation transformer, and lift the cassette holder.
(Before turning on the power make sure that there is nothing which may produce a short circuit, such as faulty soldering.)
(6) When performing a diagnosis or repair of the Main board assembly with a cassette tape in place, turn on the power, insert a cassette tape, and turn over the Main board and Mechanism assemblies together.

NOTES: • *When carrying out diagnosis and repair of the Main board assembly in the service position, be sure to ground both the Main board and the Mechanism assemblies.*

If they are improperly grounded, there may be noise on the playback picture or the FDP counter display may move even when the mechanism is kept in an inoperative status.

• *When performing diagnostics of the tape playback or recording condition in the "SERVICE POSITION", enter the desired mode before turning the set upside down, and do not change the mode during diagnostics while the set is placed upside down. If you want to switch the mode, turn the set to the normal position.*

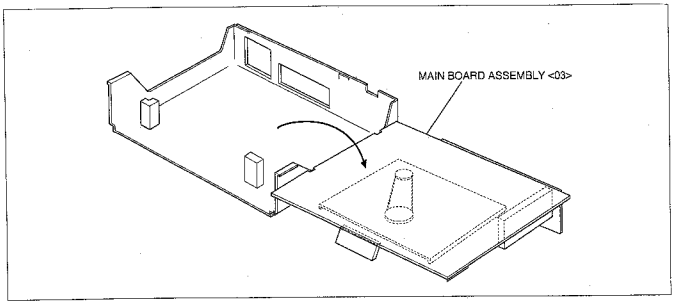


Fig. 1-4-3

1.5 MECHANISM SERVICE MODE

This model has a unique function to enter the mechanism into every operation mode without loading of any cassette tape. This function is called the "MECHANISM SERVICE MODE".

1.5.1 How to set the "MECHANISM SERVICE MODE"

(1) Disconnect VCR from AC.
(2) Connect TPGND and TP7001(TEST) on the Main board assembly with a jump wire.
(3) Connect VCR to AC.
(4) Press the power button.
(5) With lock levers Ⓐ Ⓑ on the left and right of the Cassette holder assembly pulled toward the front, slide the holder in the same direction as the cassette insertion direction. (For the positions of lock levers Ⓐ Ⓑ, refer to the "Procedures for Lowering the Cassette holder assembly" on pages 1-3 of 1.3 DISASSEMBLY/ASSEMBLY METHOD.)
(6) The cassette holder lowers and, when the loading has completed, the mechanism enters the desired mode.

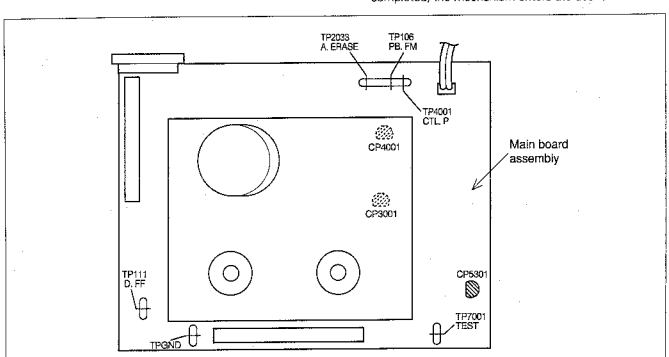


Fig. 1-5-1

1.7.2 Syscon CPU pin function (IC3001) 2/2

PIN NO.	LABEL	IN/OUT	FUNCTION
57	TU CE	OUT	CHIP ENABLE OF THE TUNER UNIT
58	SW2	OUT	TUNER SYSTEM "L" MODE:L
59	NC	-	NC
60	TU CLK	OUT	CLOCK FOR DATA TRANSFER TO THE TUNER UNIT
61	TU DATA	OUT	TUNING DATA
62	FWE	-	NC
63	NMI(L)	-	NC
64	X2	-	TIMER CLOCK (32.768KHz)
65	X1	-	TIMER CLOCK (32.768KHz)
66	RES(L)	-	RESET TERMINAL (RESETON:L)
67	OSC1(IN)	-	MAIN SYSTEM CLOCK(10MHz)
68	VSS	-	GND
69	OSC2(OUT)	-	MAIN SYSTEM CLOCK(10MHz)
70	VCC	-	SYSTEM POWER
71	MODE	-	NC
72	TU A MUTE(H)	OUT	TUNER AUDIO MUTE CONTROL (MUTE:H)
73	TU V MUTE(H)	OUT	TUNER VIDEO MUTE CONTROL (MUTE:H)
74	SW1	OUT	TUNER SYSTEM "L" MODE:H
75	I2C CLK2	OUT	SERIAL DATA TRANSFER CLOCK FOR MEMORY IC
76	I2C DATA2	IN/OUT	SERIAL DATA TRANSFER OUTPUT FOR MEMORY IC
77	NC	-	NC
78	NC	-	NC
79	NC	-	NC
80	A.MUTE(H)	OUT	AUDIO MUTE CONTROL (MUTE:H)
81	FMA_ADJ	-	NC
82	VCC	-	SYSTEM POWER
83	CCIR(H)	-	NC
84	VSS	-	GND
85	SP SHORT(H)	-	NC
86	LP SHORT(H)	-	NC
87	N.REC ST(H)	OUT	NORMAL AUDIO SOUND RECORDING START
88	H.REC ST(H)	-	NC
89	B/W(H)	-	NC
90	NC	-	NC
91	OSD CS	OUT	CHIP SELECT FOR THE ON-SCREEN IC
92	SYNC DET(H)	IN	DETECTION OF VIDEO SYNC SIGNAL (DETECTED:H)
93	P.MUTE(L)	OUT	PICTURE MUTE CONTROL (MUTE:L)
94	SECAM(H)	-	NC
95	IP ON(H)	-	NC
96	NC	-	NC
97	N.REC(H)	OUT	NORMAL AUDIO REC MODE CONTROL (REC:H)
98	C.SYNC	IN	COMPOSITE SYNC
99	A.FF	-	NC
100	V.FF	OUT	ROTATION DETECTION SIGNAL FOR DRUM MOTOR/TIMING CONTROL SIGNAL FOR REC
101	CAPPWM	OUT	CAPSTAN MOTOR CONTROL
102	DRUMPWM	OUT	DRUM MOTOR CONTROL
103	NC	-	NC
104	S PB(H)/SP SEARCH(H)	-	NC
105	EE(L)	OUT	EE/PB CONTROL (EE MODE:L)
106	NC	-	NC
107	DPG	IN	DRUM PICKUP PULSE INPUT (SWITCHING PULSE)
108	DFG	IN	DRUM FG PULSE INPUT
109	VCC	-	SYSTEM POWER
110	V.PULSE	OUT	V.PULSE ADDITION TIMING CONTROL
111	VSS	-	GND
112	CTLREF	-	CTL REFERENCE VOLTAGE

Table 1-7-2 SYSCON CPU pin function(2/2)

SECTION 2
MECHANISM ADJUSTMENT

2.1 BEFORE STARTING REPAIR AND ADJUSTMENT

2.1.1 Precautions

(1) Unplug the power cable of the main unit before using your soldering iron.
(2) Take care not to cause any damage to the conductor wires when plugging and unplugging the connectors.
(3) Do not randomly handle the parts without identifying where the trouble is.
(4) Exercise enough care not to damage the lugs, etc. during the repair work.
(5) When installing the front panel assembly, be sure to hook the lug on the back side of the cassette door to the door opener of the cassette holder. If this operation is neglected it will not be possible to remove the cassette when ejecting because the housing door cannot be opened.

2.1.2 Checking for Proper Mechanical Operations

Enter the mechanism service mode when you want to operate the mechanism when no cassette is loaded. (See 1.5 MECHANISM SERVICE MODE.)

2.1.3 Manually Removing the Cassette Tape

1. In case of electrical failures

If you cannot remove the cassette tape which is loaded because of any electrical failure, manually remove it by taking the following steps.

(1) Unplug the power cable and remove the top cover, bracket and front panel assembly. (See 1.3 DISASSEMBLY/ASSEMBLY METHOD.)
(2) Unload the cassette by manually turning the loading motor of the mechanism assembly toward the front. In doing so, hold the tape by the hand to keep the slack away from any grease. (See Fig.2-1-1.)
(3) Bring the pole base assembly (supply or take-up side) to a pause when it reaches the position where it is hidden behind the cassette tape.
(4) Move the top guide toward the drum while holding down the lug Ⓐ of the bracket retaining the top guide. Likewise hold part Ⓑ down and remove the top guide. Section Ⓒ of the top guide is then brought under the cassette lid. Then remove the top guide by pressing the whole cassette tape down. (See Fig.2-1-2.)
(5) Remove the cassette tape by holding both the slackened tape and the cassette lid.
(6) Take up the slack of the tape into the cassette. This completes removal of the cassette tape.

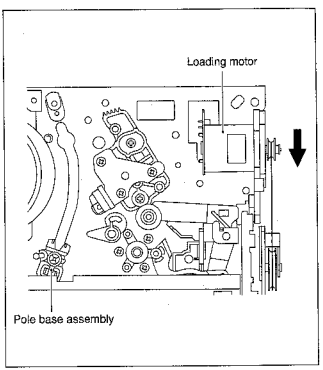


Fig. 2-1-1

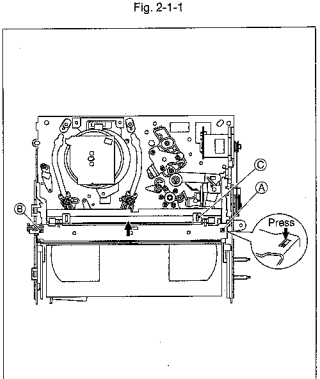


Fig. 2-1-2

2. In case of mechanical failure

If you cannot remove the cassette tape which is loaded because of any mechanical failure, manually remove it by taking the following steps.

(1) Unplug the power cable and remove the top cover, front panel assembly and others so that the mechanism assembly is visible. (See 1.3 DISASSEMBLY/ASSEMBLY METHOD.)

(2) While keeping the tension arm assembly of the mechanism assembly free from tension, pull the tape on the pole base assembly (supply or take-up side) out of the guide roller. (See Fig.2-1-3.)

(3) Take the spring of the pinch roller arm assembly off the hook of the press lever assembly, and detach it from the tape. (See Fig.2-1-4.)

(4) In the same way as in the electrical failure instructions in 2.1.3 (4), remove the top guide.

(5) Raise the cassette tape cover. By keeping it in that position, draw out the cassette tape case from the cassette holder and take out the tape.

(6) By hanging the pinch roller arm assembly spring back on the hook, take up the slack of the tape into the cassette.

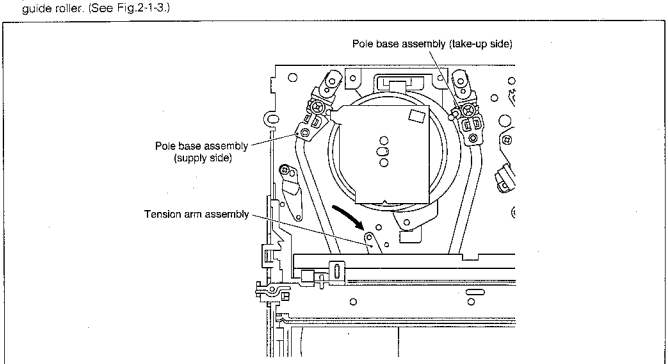


Fig. 2-1-3

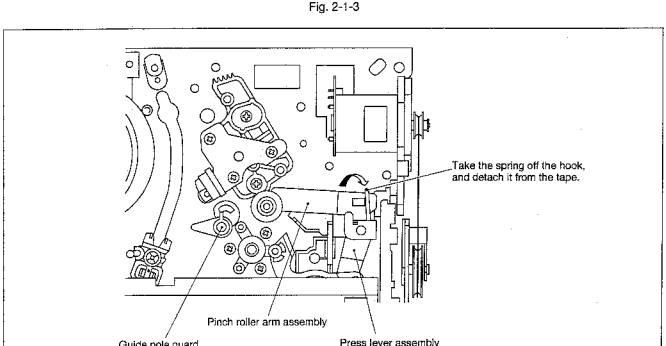


Fig. 2-1-4

2.1.4 Jigs and Tools Required for Adjustment

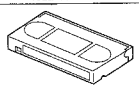
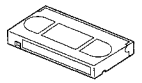
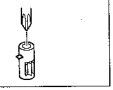
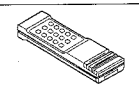
Alignment tape (SP) 4822 397 30262	Alignment tape (LP) 4822 397 30261	Back tension cassette gauge 4822 395 90615	A/C head position bit 4822 395 90916
			
Roller driver 4822 395 90904	Presetting unit 4822 395 90915		
			

Table 2-1-1 Jigs and tools required for adjustment

2.1.5 Maintenance and Inspection

1. Location of major mechanical parts

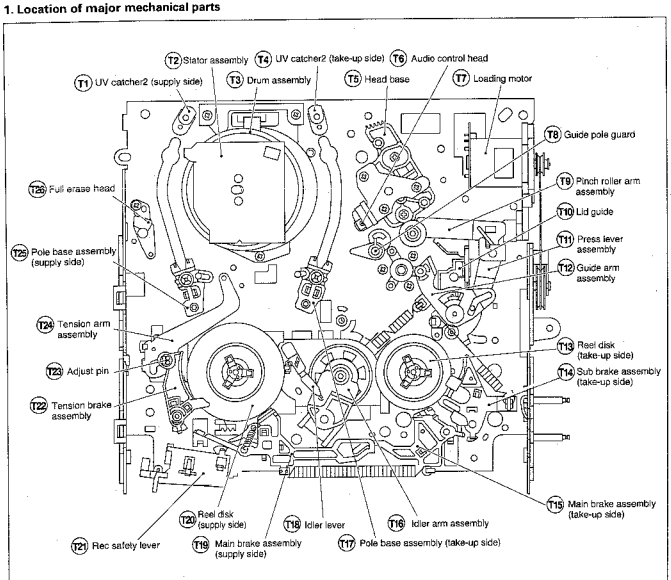

T2 Stator assembly
T4 UV catcher2 (take-up side)
T6 Audio control head
T1 UV catcher2 (supply side)
T3 Drum assembly
T5 Head base
T7 Loading motor
T8 Guide pole guard
T9 Pinch roller arm assembly
T28 Full erase head
T10 Lid guide
T11 Press lever assembly
T25 Pole base assembly (supply side)
T12 Guide arm assembly
T24 Tension arm assembly
T13 Reel disk (take-up side)
T23 Adjust pin
T14 Sub brake assembly (take-up side)
T22 Tension brake assembly
T15 Main brake assembly (take-up side)
T20 Reel disk (supply side)
T18 Idler lever
T16 Idler arm assembly
T21 Rec safety lever
T19 Main brake assembly (supply side)
T17 Pole base assembly (take-up side)

Fig. 2-1-5 Mechanism assembly top side

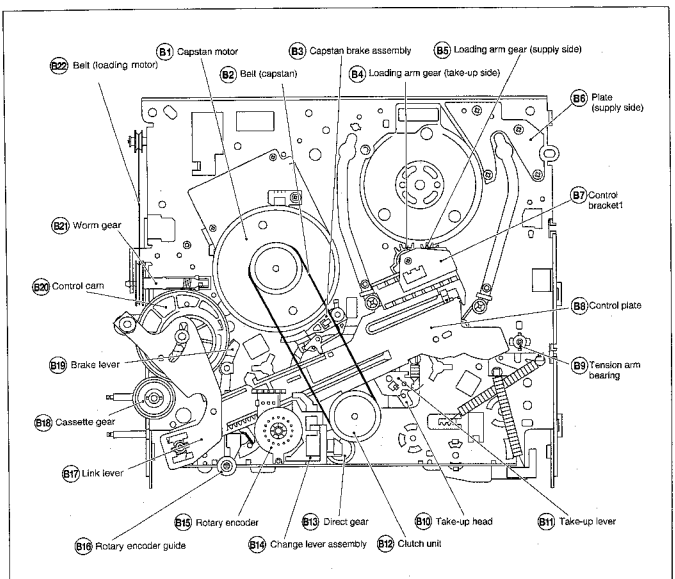


Fig. 2-1-6 Mechanism assembly bottom side

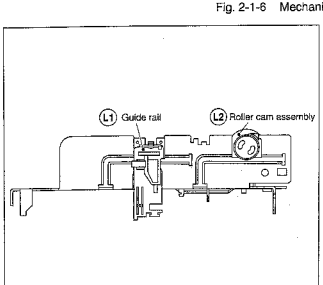


Fig. 2-1-7 Mechanism assembly left side

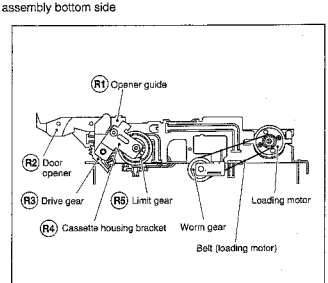


Fig. 2-1-8 Mechanism assembly right side

Note: *This table shows the order in which parts are removed for replacement. To replace parts, remove them in the order of 1 to 18 as shown in the table. To install them, reverse the removal sequence.*
The circled numbers (symbols and numbers) preceding the individual part names represent the numbers in the "Location of major mechanical parts" table. Also, the "T", "B", and "T/B" on the right of each part name shows that the particular part is removed from the front, from the back, and from both sides of the mechanism, respectively.

Symbols and numbers / Removal parts / (Reference items) Replacement parts	Front (T)/Back (B) of mechanism	Number of removal steps	(L1) Guide rail	(L2) Roller cam assembly	(R4) Cassette housing bracket	(S1) Opener guide	—	—	(R6) —	(S) Drive gear	(S) Drive arm	(T9) Pinch roller arm assembly	(T10) Guide arm assembly	(T11) Press lever assembly	(T12)(T13) UV catcher2	(B12) Rotary encoder	(B13) Clutch unit	(B14) Change lever assembly	(B15) Direct gear	(B16) Link lever	(B17) Worm gear	(B20) Control bracket1	(B21) Control plate	(B5) Loading arm gear (supply side)	(B6) Loading arm gear (take-up side)	(B11) Take-up lever	(T14) Sub brake assembly (take-up side)	(T15) Main brake assembly (take-up side)	(T16) Reel disk (take-up side)	(T17) Tension brake assembly	(T18) Tension arm assembly	(T19) Idler lever	(B19) Brake lever
(L1) 2.2.3 Guide rail	T	1																															
(L2) 2.2.3 Roller cam assembly	T	1																															
(R4) 2.2.3 Cassette housing bracket	T	1																															
(S1) 2.2.3 Opener guide	T	2				1																											
(R6) 2.2.3 Door opener	T	3				1	2																										
— 2.2.3 Relay gear	T	3				1	2																										
(R5) 2.2.3 Limit gear	T	3				1	2																										
— 2.2.3 Cassette holder assembly	T	5	1	2	3	4	5																										
(R2) 2.2.3 Drive gear	T	4			1	2	3																										
— 2.2.3 Drive arm	T	8	1	2	3	4	5	6	7																								
(T9) 2.2.4 Pinch roller arm assembly	T	1																															
(T10) 2.2.5 Guide arm assembly	T	1																															
(T11) 2.2.5 Press lever assembly	T	3										1	2																				
(T12) 2.2.6 Audio control head	T	1																															
(T1) 2.2.7 Loading motor	T	1																															
(B1) 2.2.8 Capstan motor	T/B	1																															
(T12)(T13) 2.2.9 UV catcher2	T	1																															
(T17) 2.2.9 Pole base assembly (take-up side)	T/B	2													1																		
(T23) 2.2.9 Pole base assembly (supply side)	T/B	2													1																		
(B12) 2.2.10 Rotary encoder	B	1																															
(B13) 2.2.11 Clutch unit	B	1																															
(B14) 2.2.12 Change lever assembly	B	3															1	2															
(B15) 2.2.12 Direct gear	B	4															1	2	3														
— 2.2.12 Clutch gear1	B	5															1	2	3	4													
(B16) 2.2.13 Link lever	B	1																			1												
(B18) 2.2.14 Cassette gear	B	2																				1											
(B20) 2.2.14 Control cam	B	2																				1											
(B17) 2.2.14 Worm gear	B	1																															
(T8) — Lid guide	T/B	5										1	2	3									4										
(B7) 2.2.15 Control bracket1	B	1																															
(B8) 2.2.15 Control plate	B	6															1	2	3		4		5										
(B5) 2.2.16 Loading arm gear (supply side)	B	7															1	2	3		4		5	6									
(B4) 2.2.16 Loading arm gear (take-up side)	B	8															1	2	3		4		5	6	7								
— 2.2.16 Loading arm gear shaft	B	9															1	2	3		4		5	6	7	8							
(B11) 2.2.17 Take-up lever	T/B	7															1	2	3		4		5	6									
(B10) 2.2.17 Take-up head	T/B	8															1	2	3		4		5	6			7						
— 2.2.17 Control plate guide	T/B	8															1	2	3		4		5	6			7						
(B9) 2.2.18 Capstan brake assembly	T/B	7															1	2	3		4		5	6									
(T14) 2.2.19 Sub brake assembly (take-up side)	T/B	15	1	2	3	4	5	6	7	8							9	10	11		12		13	14									
(T15) 2.2.20 Main brake assembly (take-up side)	T/B	16	1	2	3	4	5	6	7	8							9	10	11		12		13	14				15					
(T16) 2.2.20 Main brake assembly (supply side)	T/B	9	1	2	3	4	5	6	7	8																							
(T16) 2.2.20 Reel disk (take-up side)	T/B	16	1	2	3	4	5	6	7	8							9	10	11		12		13	14				15					
(T20) 2.2.21 Tension brake assembly	T/B	9	1	2	3	4	5	6	7	8																				9			
(T22) 2.2.21 Reel disk (supply side)	T/B	10	1	2	3	4	5	6	7	8																				9			
(T24) 2.2.21 Tension arm assembly	T/B	10	1	2	3	4	5	6	7	8																				9			
(B3) 2.2.21 Tension arm bearing	T/B	10	1	2	3	4	5	6	7	8																					13	16	
(T19) 2.2.22 Idler lever	T/B	17	1	2	3	4	5	6	7	8							9	10	11		12		13	14							13	16	17
(T19) 2.2.22 Idler arm assembly	T/B	18	1	2	3	4	5	6	7	8							9	10	11		12		13	14				15	16	17			
(B19) - Brake lever	T/B	18	1	2	3	4	5	6	7	8							9	10	11		12		13	14				15	16	17			18
(B19) - Rotary encoder guide	T/B	19	1	2	3	4	5	6	7	8							9	10	11		12		13	14				15	16	17			

2. Cleaning

Regular cleaning of the transport system parts is desirable but practically impossible. So make it a rule to carry out cleaning of the tape transport system whenever the machine is serviced.

When the video head, tape guide and/or brush get soiled, the playback picture may appear inferior or at worst disappear, resulting in possible tape damage.

(1) When cleaning the upper drum (especially the video head), soak a piece of closely woven cloth or Kimu-wipe with alcohol and while holding the cloth onto the upper drum by the fingers, turn the upper drum counterclockwise.

Note: ***Absolutely avoid sweeping the upper drum vertically as this will cause damage to the video head.***

(2) To clean the parts of the tape transport system other than the upper drum, use a piece of closely woven cloth or a cotton swab soaked with alcohol.

(3) After cleaning, make sure that the cleaned parts are completely dry before using the video tape.

3. Lubrication

With no need for periodical lubrication, you have only to lubricate new parts after replacement. If any oil or grease on contact parts is soiled, wipe it off and newly lubricate the parts.

(1) See the mechanism assembly and disassembly diagrams (M4) for the lubricating or greasing spots. See Table 2-1-2 for the types of oil or grease to be used.

Type	Symbols on the disassembly diagrams
Grease	AA
Oil	BB

Table 2-1-2 Grease and oil used for the unit

4. Suggested servicing schedule for main components

The following table indicates the suggested period for such service measures as cleaning,lubrication and replacement. In practice, the indicated periods will vary widely according to environmental and usage conditions.However, the indicated components should be inspected when a set is brought for service and the maintenance work performed if necessary. Also note that rubber parts may deform in time,even if the set is not used.

System	Parts Name	Operation Hours	
		~1000H	~2000H
Tape transport	Upper drum assembly	★○	○
	A/C head	★○	★○
	Lower drum assembly	★	★○
	Pinch roller arm assembly	★	★
	Full erase head	★	★
	Tension arm assembly	★	★
	Capstan motor (Shaft)	★	★
	Guide arm assembly	★	★
Drive	Capstan motor		○
	Capstan brake assembly		○
	Main brake assembly		○
	Belt (Capstan)	○	○
	Belt (Loading motor)		○
	Loading motor		○
	Clutch unit		○
	Worm gear		○
	Control plate		○
Other	Brush	★○	★○
	Tension brake assembly	○	○
	Rotary encoder		○

★: Cleaning

○: Inspection or Replacement if necessary

Table 2-1-3

2.2 REPLACEMENT OF MAJOR PARTS

2.2.1 Before Starting Disassembling (Phase matching between mechanical parts)

The mechanism of this unit is closely linked with the rotary encoder and system controller circuits.

Since the system controller detects the status of mechanical operation in response to phases of the rotary encoder (internal switch positions), the mechanism may not operate properly unless such parts as the rotary encoder, control plate, loading arm gear, control cam, cassette gear, limit gear, relay gear and drive gear are installed in their correct positions.

Especially, this model is not provided with any cassette housing assembly, so that cassette loading and unloading must be accomplished by operation of the cassette holder assembly. The latter is in turn driven by such parts as the drive gear, relay gear and limit gear. Exercise enough care, therefore, to have the phases of all this gear matching one another.

(For information on phase matching of the mechanism, see the instructions on how to install individual parts.)

This unit is provided with a mechanism assembly mode. It is therefore necessary to enter this mode for assembling and disassembling procedures.
This mode is usually not in use, manually set it when it is required.

2.2.2 How to Set the Mechanism Assembling Mode

Remove the mechanism assembly and place it bottom side up. (See SECTION 1 DISASSEMBLY.) Turn the worm gear toward the front so that the guide hole of the control cam is brought into alignment with the hole at the mechanism assembly chassis. This position renders the mechanism assembling mode operational. Make sure that the control plate is located in alignment with the mark E. (See Fig.2-2-1.)

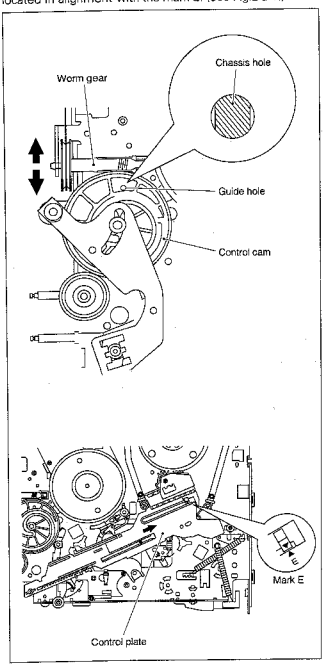


Fig. 2-2-1

2.2.3 Cassette Holder Assembly

1. How to remove

(1) Remove the guide rail and roller cam assembly. (See Fig.2-2-2.)
(3 lugs on the guide rail and one lug on the roller cam assembly)

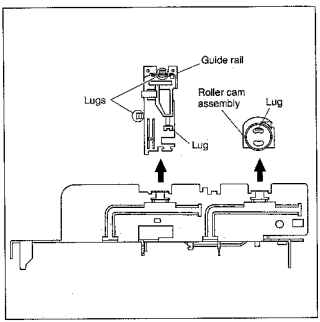


Fig. 2-2-2

(2) Remove the two slit washers and remove the cassette housing bracket. (See Fig.2-2-3.)
(3) Remove the opener guide, spring(A), door opener, relay gear and limit gear. (See Fig.2-2-3.)

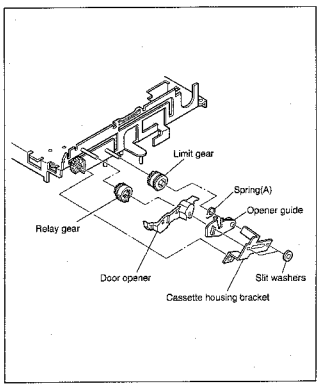


Fig. 2-2-3

(4) While swinging the lock levers (R) and (L) of the cassette holder assembly toward the front, slide the cassette holder assembly until its legs come to where the guide rail and the roller cam assembly have been removed (so that the drive arm is upright). (See Fig.2-2-4.)

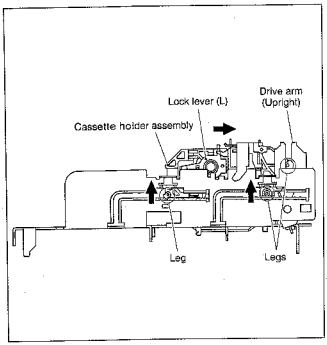


Fig. 2-2-4

(5) While holding the left side of the cassette holder, lift the cassette holder assembly so that the three legs on the left side are all released. Then pull the legs Ⓐ and Ⓑ on the right side out of the rail and also pull up the leg Ⓒ. (See Fig.2-2-5 and Fig.2-2-6.)

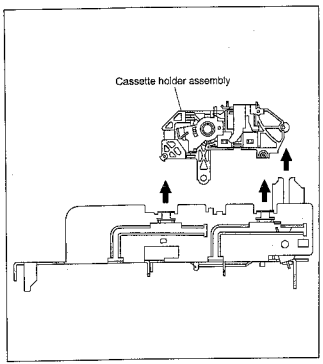


Fig. 2-2-5

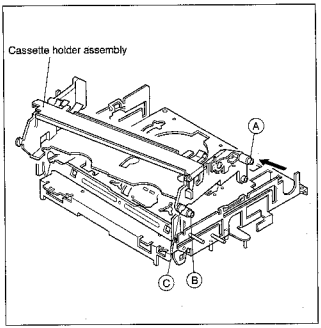


Fig. 2-2-6

(6) Draw out the drive gear, and remove the drive arm.

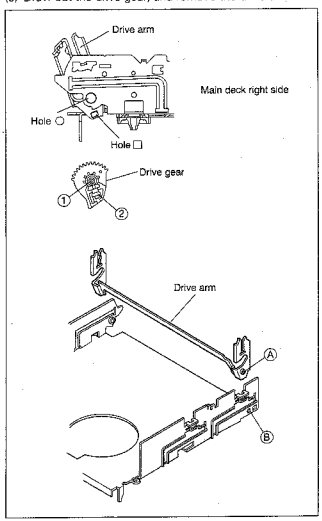


Fig. 2-2-7

2. How to install (Phase matching)

(1) Insert the section Ⓐ of the drive arm into the section Ⓑ of the main deck.

(2) Insert the section ① of the drive gear into the round hole, and the section ② into the square hole on the drive arm. (See Fig.2-2-7.)

(3) Hold the drive arm upright and fit the leg Ⓒ on the right side of the cassette holder assembly into the groove. (See Fig.2-2-8.)

(4) While swinging the lock lever (R) of the cassette holder assembly toward the front, put the legs Ⓐ and Ⓑ into the rail. (See Fig.2-2-8.)

(5) Drop the three legs on the left side of the cassette holder assembly into the groove at one time. (See Fig.2-2-9.)

(6) Slide the whole cassette holder assembly toward the front to bring it to the eject end position.

(7) Install the limit gear so that the notch on the outer circumference of the limit gear is brought into alignment with the guide hole on the main deck. (See Fig.2-2-10.)

(8) Install so that the notch on the periphery of the relay gear is aligned with the notch of the main deck and that hole A of the relay gear is aligned with the hole A of the limit gear and that hole B of the relay gear is aligned with the hole B of the drive gear. (See Fig.2-2-10.)

(9) Install the door opener, opener guide, spring(A) and cassette housing bracket and fasten the two slit washers.

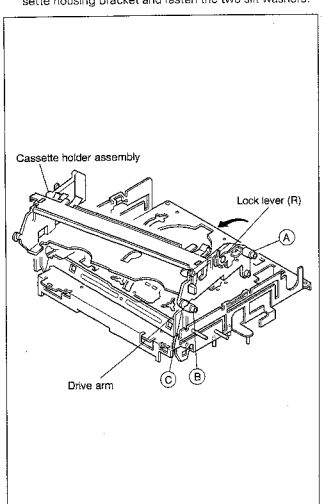


Fig. 2-2-8

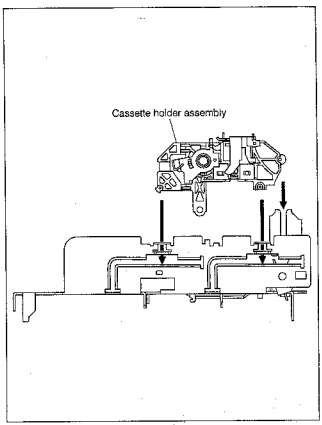


Fig. 2-2-9

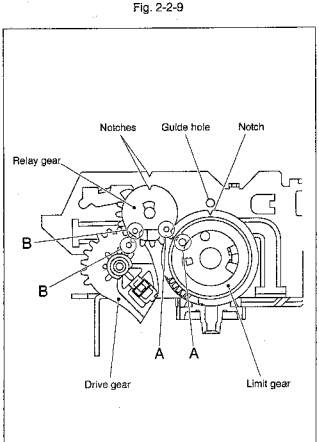


Fig. 2-2-10

2.2.4 Pinch Roller Arm Assembly

1. How to remove

(1) Remove the spring from the hook of the press lever assembly.
(2) Remove the slit washer and remove the pinch roller seat 2. (See Fig.2-2-11.)
(3) Remove the pinch roller arm assembly by pulling it up.

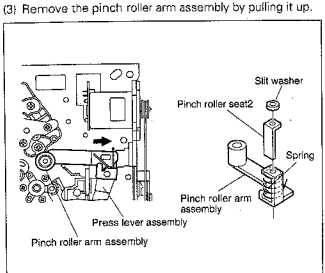


Fig. 2-2-11

2.2.5 Guide Arm Assembly and Press Lever Assembly

1. How to remove

(1) Remove the spring and expand the lug of the lid guide in the arrow-indicated direction. Then remove the guide arm assembly by pulling it up.
(2) Remove the press lever assembly by pulling it up. (See Fig.2-2-12.)

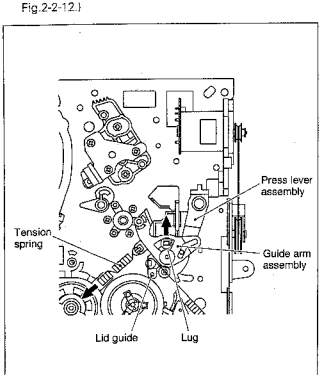


Fig. 2-2-12

2.2.6 Audio Control Head

1. How to remove

(1) Remove the two screws (A) and remove the audio control head together with the head base.

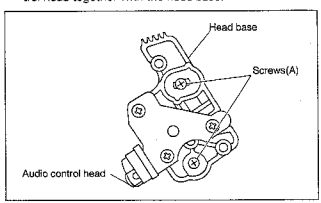


Fig. 2-2-13

(2) When replacing only the audio control head, remove the three screws (B) while controlling the compression spring.

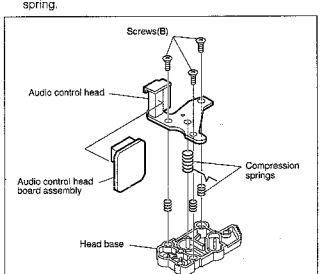


Fig. 2-2-14

2. How to install

(1) To make the post-installation adjustment easier, set the temporary level as indicated in Fig.2-2-15. Also make sure that the screw center is brought into alignment with the center position of the slot.

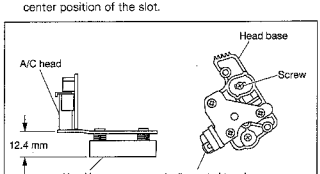


Fig. 2-2-15

2.2.7 Loading Motor

1. How to remove

(1) Remove the belt wound around the worm gear.
(2) Open the two lugs of the motor guide and remove the loading motor, loading motor board assembly and motor guide altogether by pulling them up.
(3) When replacing the loading motor board assembly, take care with the orientation of the loading motor. (Install so that the loading motor label faces upward.)
(4) When the motor pulley has been replaced, choose the fitting dimension as indicated in Fig.2-2-16.

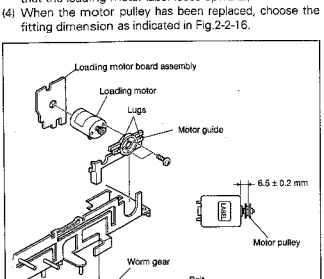


Fig. 2-2-16

2.2.8 Capstan Motor

1. How to remove

(1) Remove the belt (capstan) on the mechanism assembly back side.
(2) Remove the three screws (A) and remove the capstan motor.

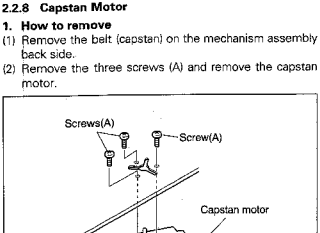


Fig. 2-2-17

2. How to install (Centering the mounting position)

When the capstan motor has once been removed and then reinstalled out of the initial correct position in the rotational direction, the capstan motor current may be unstable during operation in high or low temperatures. This may result in greater Wow & Flutter and occasionally in power breakdown because of current over - load. Install the capstan motor while following the procedure given below.
(The capstan motor is centrally located when the unit is shipped from the factory.)

(1) Provisionally tighten the three screws (A) securing the capstan motor.
(2) Install the mechanism assembly to which the capstan motor is provisionally fastened on the bottom chassis which incorporates the Main board assembly. (No need to tighten the screws for mounting the mechanism.) Make sure that all the connectors for the mechanism assembly and the Main board assembly are correctly installed as indicated in Fig. 2-2-18.

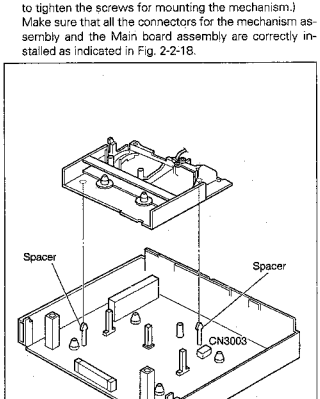


Fig. 2-2-18

(3) Making sure that the connector CN3003 of the capstan motor is correctly mounted, and securely tighten the three screws (A).

Note: ***When the capstan motor has been replaced with a new one, perform recording in the EP mode for at least 2 minutes at normal temperatures immediately before starting the FF/REW or SEARCH operations (Aging).***

2.2.9 Pole Base Assembly (supply or take-up side)

1. How to remove

(1) Remove the UV catcher 2 on the removal side by loosening the screw (A).

(2) Remove the pole base assembly on the supply side from the mechanism assembly by loosening the screw (B) on the mechanism assembly back side and sliding the pole base assembly toward the UV catcher 2.

(3) As for the pole base assembly on the take-up side, turn the pulley of the loading motor to lower the cassette holder because the screw (B) is hidden under the control plate. (See the "Procedures for Lowering the Cassette holder assembly" of 1.3 DISASSEMBLY/ASSEMBLY METHOD.) Further turn the motor pulley to move the cassette holder until the screw (B) is no longer under the control plate (in the half-loading position). Then remove it as done for the supply side by removing the screw (B).

NOTE: *After reinstalling the Pole base assembly and the UV catcher2, be sure to perform compatibility adjustment.*

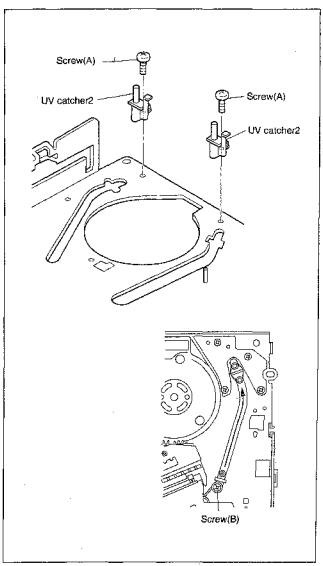


Fig. 2-2-19

2.2.10 Rotary Encoder

1. How to remove

(1) Remove the screw (A) and remove the rotary encoder by pulling it up. (See Fig. 2-2-20.)

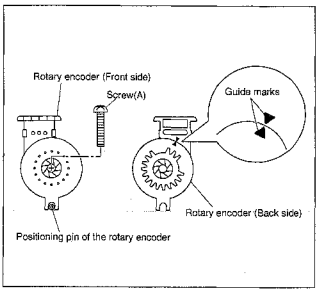


Fig. 2-2-20

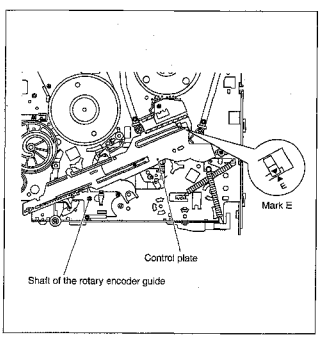


Fig. 2-2-21

2. How to install (Phase matching)

(1) Make sure that the mark E of the control plate is in alignment with the mark ▼ of the loading arm gear shaft and bring the guide marks on the rotary encoder into alignment as indicated in Fig.2-2-20. (See Fig. 2-2-20 and Fig. 2-2-21.)

(2) Turn over the rotary encoder with its guide marks kept in alignment and install it by fitting on the shaft of the rotary encoder guide and the positioning pin.

(3) Tighten the screw (A) to complete the installation.

2.2.11 Clutch Unit

(1) Remove the belt wound around the capstan motor and the clutch unit.
(2) Remove the slit washer and remove the clutch unit.

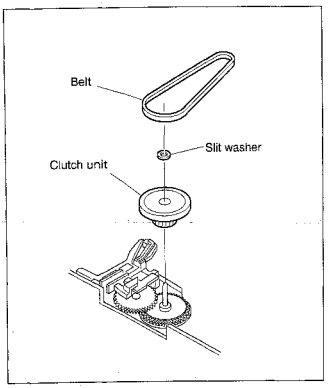


Fig. 2-2-22

2.2.12 Change Lever Assembly, Direct Gear and Clutch Gear1

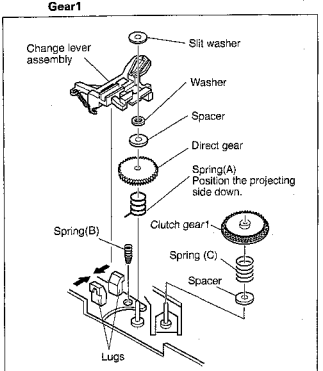


Fig. 2-2-23

1. How to remove

(1) Release the two lugs of the rotary encoder guide in the arrow-indicated direction and remove the change lever assembly.
(2) Remove the slit washer retaining the direct gear and remove the latter.
Take care so as not to lose the washer and spring. (See Fig.2-2-23.)

2. How to install

(1) Install the clutch gear1, spring (A), spring (C), direct gear, spacer and others to the individual shafts of the main deck, and finally the slit washer. (See Fig.2-2-23.)
(2) Let the spring (B) drops into the rotary encoder guide hole and install the change lever assembly.(Take care not to mistake a direction of the spring.) The point is to slightly lift the clutch gear1 and catch it from the both sides with the assembly. (See Fig.2-2-24.)

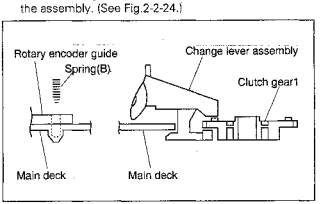


Fig. 2-2-24

2.2.13 Link Lever

1. How to remove

(1) Remove the two slit washers.
(2) Remove the link lever by lifting it from the shaft retained by the slit washers. Then swing the link lever counterclockwise and remove it from the locking section of the control plate.

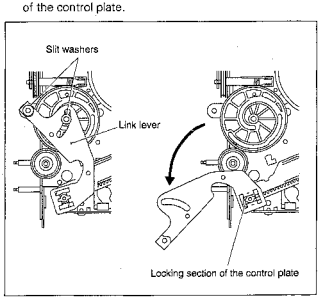


Fig. 2-2-25

2. How to install (Phase matching)

(1) Slide the control plate so that its mark E is aligned with the mark ▼ on the loading arm gear shaft. (See Fig.2-2-26.)
(2) Rotate the worm gear until the guide hole of the control cam is aligned exactly with the guide hole of the main deck. (See Fig.2-2-27.)
(3) Insert the link lever into the locking section of the control plate. (See Fig.2-2-25.)
(4) Rotate the link lever clockwise so that it is installed on the shafts in the center and on the left of the control cam.
(5) Fasten the slit washers at these two points.

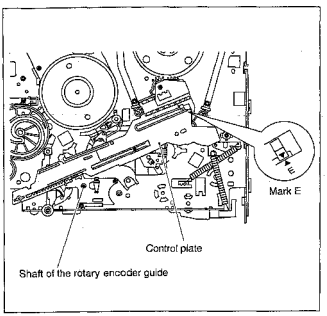


Fig. 2-2-26

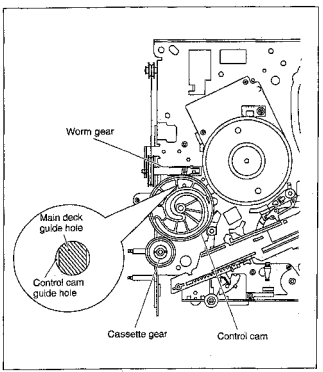


Fig. 2-2-27

2.2.14 Cassette Gear, Control Cam and Worm Gear

1. How to remove

(1) Remove the control cam by lifting it.
(2) Open the two lugs of the cassette gear outward and pull the latter off.
(3) Remove the belt wound around the worm gear and the loading motor.
(4) Open the lug of the lid guide outward and remove the worm gear.

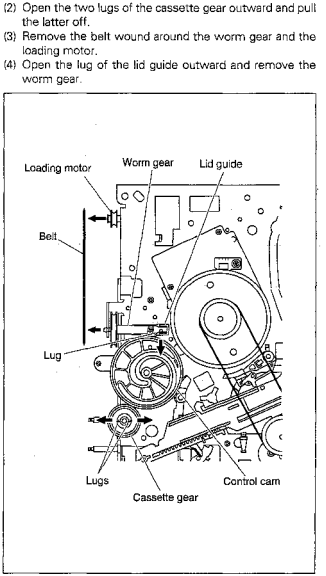


Fig. 2-2-28

2.2.15 Control Plate

1. How to remove

(1) Remove the screw (A) retaining the control bracket 1 and remove the latter.
(2) Slide the control plate as indicated by the arrow and remove the control plate. (See Fig.2-2-29.)

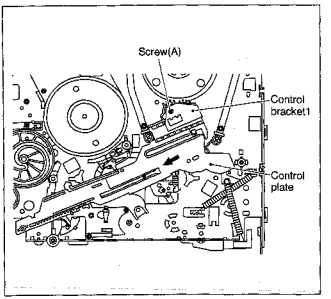


Fig. 2-2-29

2. How to install (Phase matching)

(1) Adjust the position of the idler arm assembly pin as indicated in Fig.2-2-30 (to the left of centre of the R section).

(2) Bring the guide hole of the take-up lever into alignment with the hole at the control plate guide and fix the position by inserting a 1.5 mm hexagonal wrench.

(3) Install the control plate so that the section A of the loading arm gear shaft fits into the hole (A) of the control plate, the section B of the control plate guide into the hole (B), and the control plate comes under the section C of the rotary encoder guide and the section D of the loading arm gear shaft while press-fit the pole base assmebly (supply side) as indicated by the arrow. It is important that the tension arm assembly shaft is positioned closer toward you than the control plate. (See Fig.2-2-31.)

(4) Make sure that the mark E of the control plate is in alignment with the mark ▼ of the loading arm gear shaft. (See Fig.2-2-31.)

(5) Pull off the hexagonal wrench for positioning.

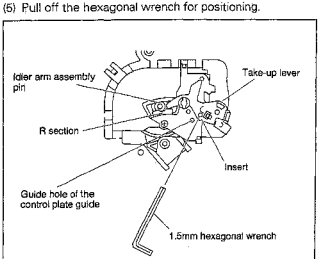


Fig. 2-2-30

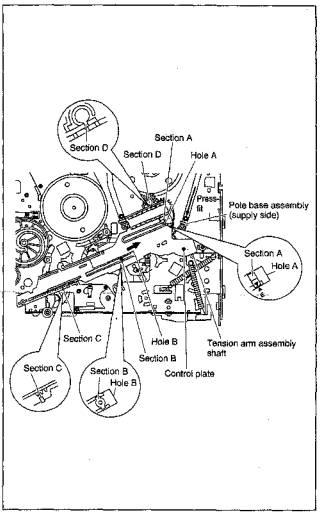


Fig. 2-2-31

2.2.16 Loading Arm Gear (supply or take-up side) and Loading Arm Gear Shaft

1. How to remove

(1) Remove the loading arm gear (supply side) by loosening the screw (A). (See Fig. 2-2-32.)

(2) Remove the screw (B) and remove the torsion arm from the pole base assembly (take-up side). (See Fig.2-2-32.)

(3) Turn the loading arm gear (take-up side) clockwise so that the notch of the loading arm gear (take-up side) is in alignment with the projection of the loading arm gear shaft and lift it.
Likewise, turn the loading arm counterclockwise so that the notch is in alignment with the projection and remove the loading arm gear (take-up side). (See Fig.2-2-32 and Fig. 2-2-33.)

(4) When removing the loading arm gear shaft, be sure of first removing the screw retaining the drum assembly (on the back side of the loading arm gear shaft). Then remove the screw (C) and remove the loading arm gear shaft by sliding it.

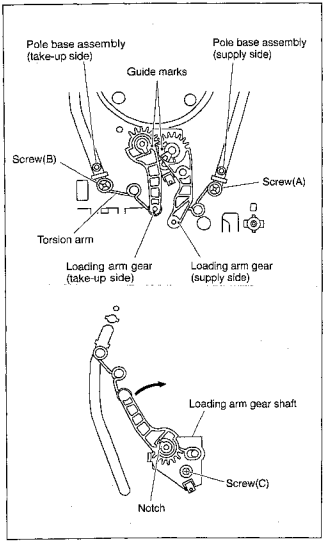


Fig. 2-2-32

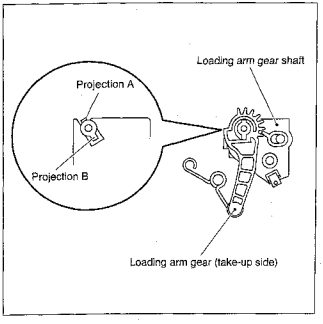


Fig. 2-2-33

2. How to install

(1) Align the notch of the loading arm gear (take-up side) to the projection B of the loading arm gear shaft and slip it over. Then rotate it clockwise for alignment with the projection A and slip it down to the bottom. (See Fig.2-2-33.)

(2) Then turn the loading arm gear (take-up side) counterclockwise. Hang the torsion arm on the pole base assembly (take-up side) and tighten the screw (B).

(3) Install the loading arm gear (supply side) so that the guide mark of the loading arm gear (take-up side) is in alignment with the guide mark of the loading arm gear (supply side). Then hang the torsion arm on the pole base assembly (supply side) and tighten the screw (A). (See Fig.2-2-32.)

2.2.17 Take-up Lever, Take-up Head and Control Plate Guide

(1) Remove the spring of the take-up lever from the main deck.

(2) Remove the lug (A) of the take-up lever from the main deck and pull out the take-up lever and the take-up head together.

(3) Remove the screw (A).

(4) Align the idler arm assembly pin in the center of the R section of the control plate guide, remove the control plate guide lugs (B) and (C) from the main deck, and remove the control plate guide.

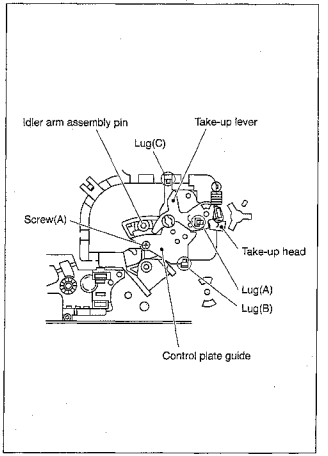


Fig. 2-2-34

2.2.18 Capstan Brake Assembly

1. How to remove

(1) Move the lug (A) of the capstan brake assembly in the arrow-indicated direction so that it comes into alignment with the notch of the main deck. (See Fig. 2-2-35.)

(2) Remove the lug (B) of the capstan brake assembly from the main deck and remove the capstan brake assembly.

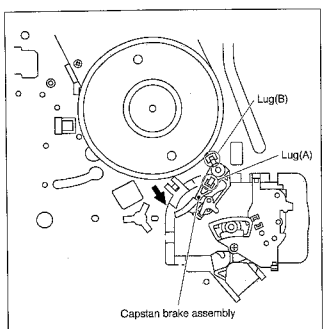


Fig. 2-2-35

2.2.19 Sub Brake Assembly (take-up side)

1. How to remove

(1) Remove the spring attached to the lid guide and sub brake assembly (take-up side).

(2) Bring the lug (A) of the sub brake assembly (take-up side) into alignment with the notch of the main deck.

(3) Remove the lugs (B) and (C) of the sub brake assembly (take-up side) from the main deck and remove the sub brake assembly (take-up side).

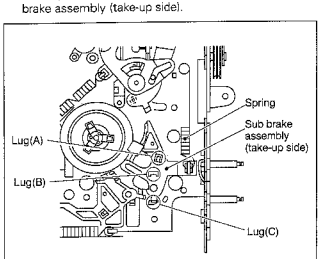


Fig. 2-2-36

2.2.20 Main Brake Assembly (take-up side), Reel Disk (take-up side) and Main Brake Assembly (supply side)

1. How to remove

(1) Move the main brake assembly (take-up side) in the arrow-indicated direction and remove the reel disk (take-up side).

(2) Remove the spring attached to the main brake assembly.

(3) Remove the lug (A) of the main brake assembly (take-up side) and pull out the lug (B) after bringing it into alignment with the main deck notch.

(4) Remove the lugs (C), (D) and (E) of the main brake assembly (supply side) from the main deck and pull them off. (See Fig.2-2-37.)

Note: *If the main brake assembly is difficult to remove, press it and hold the adjustment pin from the back side of the main deck when attempting to remove it. After the adjustment pin has been removed or the main brake assembly or the reel disk on the supply or take-up side have been replaced, it is required to adjust the main brake assembly torque. See page 2-23 for the detailed adjustment procedures.*

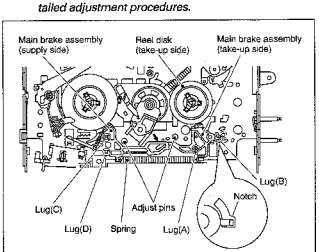


Fig. 2-2-37

(5) When installing the main brake assembly (take-up side), slide the brake lever in the direction as indicated by the arrow to prevent it from hitting the projection of the main brake assembly (take-up side). (See Fig.2-2-38.)

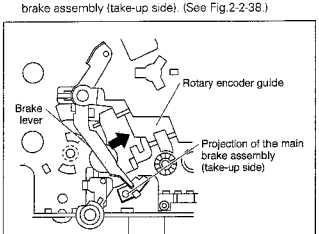


Fig. 2-2-38

2.2.21 Tension Brake Assembly, Reel Disk (supply side) and Tension Arm Assembly

1. How to remove

(1) Remove the three lugs of the tension brake assembly from the main deck and pull them off.
(2) Remove the reel disk (supply side) by loosening in the arrow-indicated direction the main brake assembly (supply side).
(3) Remove the tension spring on the back of the main deck. Then release the lug of the tension arm bearing in the arrow-indicated direction and draw out the tension arm assembly. (See Fig. 2-2-39.)

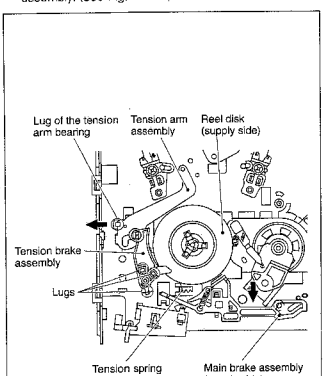


Fig. 2-2-39

2.2.22 Idler Lever, Idler Arm Assembly

1. How to remove

(1) Remove the lug of the idler lever from the main deck and remove the hook fitted in the idler arm assembly hole by lifting it.
(2) Remove the slit washer and pull out the idler arm assembly.

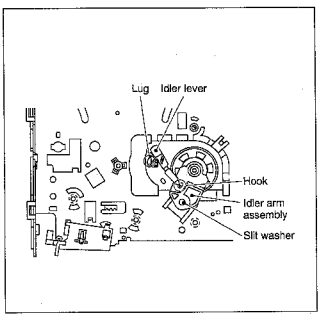


Fig. 2-2-40

2.2.23 Stator Assembly

(1) Remove the flat cable.
(2) Remove the two screws (A).
(3) Remove the stator assembly by lifting in the arrow-indicated direction. (Take care that the brush spring does not jump out.)
(4) After installation, be sure to perform the PB switching point adjustment according to the electrical adjustment procedure.

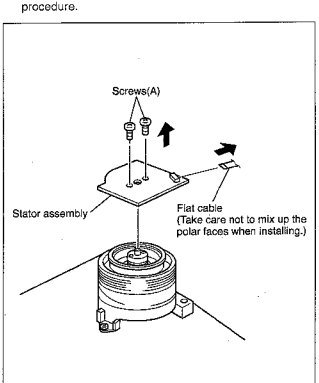


Fig. 2-2-41

2.2.24 Rotor Assembly

(1) Remove the stator assembly.
(2) Remove the two screws (B) and remove the rotor assembly.

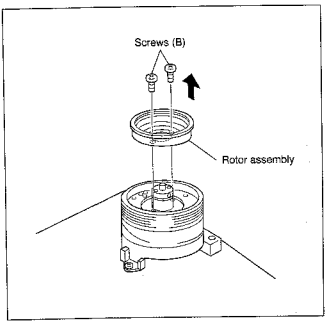


Fig. 2-2-42

Note: *When installing the rotor assembly, note that a normal picture cannot be obtained without ensuring the phase matching as mentioned below.*

(3) Match the phases of the upper drum assembly and the rotor assembly as indicated in Fig.2-2-43.
(4) Place the upper drum assembly hole (a) over the rotor assembly holes (b) (with three holes to be aligned) and tighten the two screws (B). (See Fig.2-2-43.)

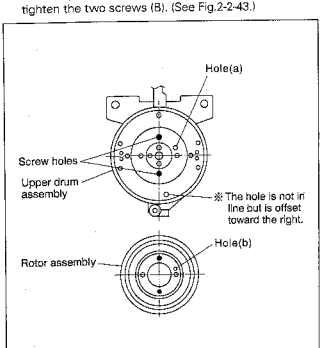


Fig. 2-2-43

2.2.25 Upper Drum Assembly

1. How to remove

(1) Remove the stator assembly and rotor assembly.
(2) Loosen the screw of the collar assembly using a 1.5 mm hexagonal wrench and remove the collar assembly. Also remove the brush, spring and cap at one time.
(3) Remove the upper drum assembly and remove the washer using tweezers.

Note: *When replacement is required, control the up-down movement of the brush. Never apply grease.*

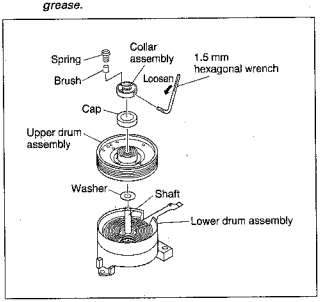


Fig. 2-2-44

2. How to install

(1) Clean the coil parts of the lower drum assembly and the newly installed upper drum assembly with an air brush in advance. (See Fig.2-2-45.)
(2) Install a new washer and upper drum assembly on the drum shaft. (See Fig.2-2-44.)

Note: *When replacing the upper drum assembly, replace it the together with the washer.*

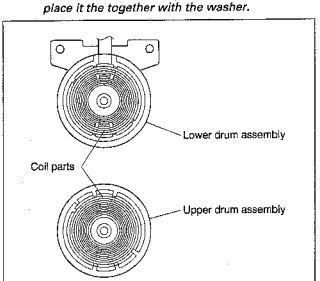


Fig. 2-2-45

(3) Install the cap to the upper drum assembly.
(4) Position the collar assembly as indicated in Fig.2-2-46 while controlling its up- down movement.

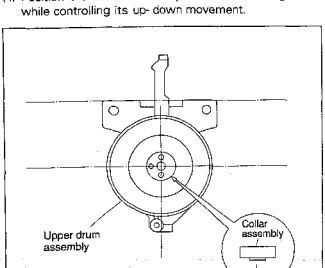


Fig. 2-2-46

(5) Secure the collar assembly in position with a hexagonal wrench while pressing its top with the fingers.

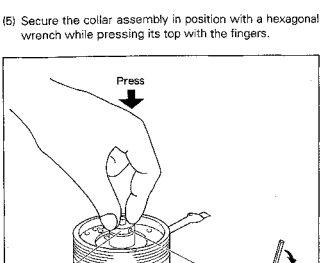


Fig. 2-2-47

(6) After installation, gently turn the upper drum assembly with your hand to make sure that it turns normally. Then install the brush and the spring.
(7) Install the rotor assembly and stator assembly according to Fig 2-2-41 and 2-2-42.
(8) When installation is complete, clean the upper drum assembly and lower drum assembly and carry out the following adjustments.
- PB switching point adjustment
- Slow tracking adjustment
- Compatibility adjustment (Be sure to check for compatibility for the LP mode.)

2.3 COMPATIBILITY ADJUSTMENT

Notes: • *Although compatibility adjustment is very important, it is not necessary to perform this as part of the normal servicing work. It will be required when you have replaced the audio control head, drum assembly or any part of the tape transport system.*
• *To avoid any damage to the alignment tape while performing the compatibility adjustment, get a separate cassette tape (for recording and play back) ready to be used for checking the initial tape running behavior.*

2.3.1 Checking/Adjustment of FM Waveform Linearity

(1) Connect the oscilloscope to TP106(PB.FM) of the main board assembly and to TP111(D.FF) of the main board assembly for external sync connection.
(2) Playing the alignment tape (SP), observe the FM waveform.
(3) Press the channel buttons (▲, ▼) simultaneously during playback to enter the manual tracking mode. (This also brings tracking to the centre.)
(4) Make sure that there is no significant level drop of the FM waveform caused by the tracking operation, with its generally parallel and linear variation ensured. Perform the following adjustments when required. (See Fig.2-3-1.)
(5) Reduce the FM waveform while pressing the channel buttons (▲, ▼) during playback. If a drop in level is found on the left side, turn the guide roller of the pole base assembly (supply side) with the roller driver to make the FM waveform linear.
If a drop in level is on the right side, likewise turn the guide roller of the pole base assembly (take-up side) with the guide roller to make it linear. (See Fig.2-3-3.)
(6) Then play (EP) and make sure that the FM waveform varies in parallel and linearly with the tracking operation. When required, perform fine-adjustment of the guide roller of the pole base assembly (supply or take-up side).
(7) Unload the cassette tape once, play the alignment tape (EP) again and confirm the FM waveform.

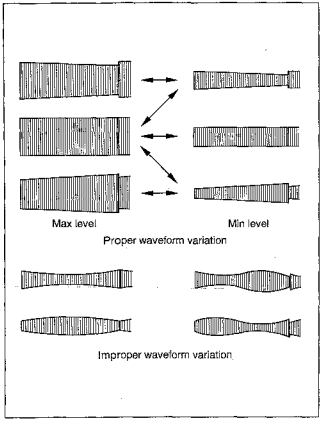


Fig. 2-3-1

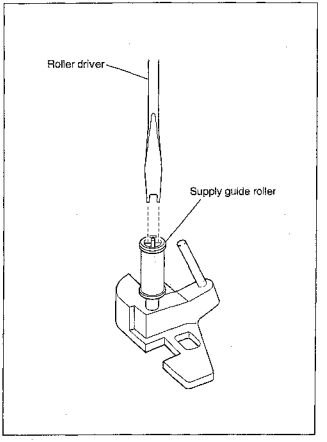


Fig. 2-3-2

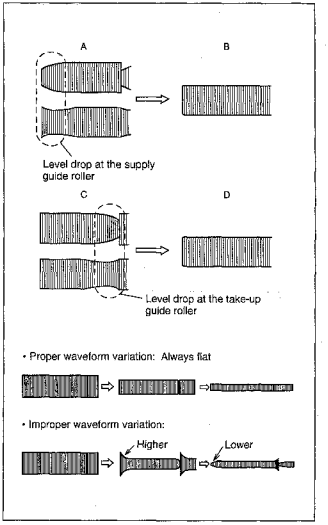


Fig. 2-3-3

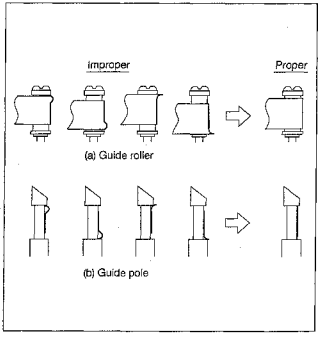


Fig. 2-3-4

2.3.2 Checking/Adjustment of the Height and Tilt of the Audio Control Head

Note: *Set a temporary level of the height of the A/C head in advance to make the adjustment easier after the A/C head has been replaced. (See Fig.2-2-15.)*

(1) Connect CH-1 of the oscilloscope to AUDIO OUT and CH-2 to TP4001 (CTL.P) of the main board assembly and observe the waveforms on both channels in the ALT mode.
(2) Play the alignment tape (SP) and adjust it by turning the screws (1), (2) and (3) little by little until the waveform of both the audio output signal and the control pulse reach maximum. The screw (1) and screw (3) are for adjustment of tilt and screw (2) for azimuth.

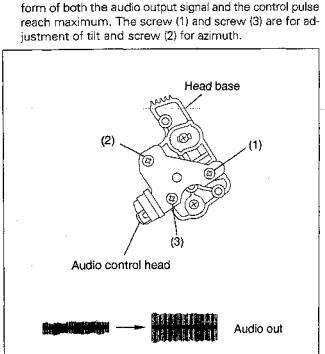


Fig. 2-3-5

2.3.3 Checking/Adjustment of the Audio Control Head Phase (X-Value)

(1) Connect the oscilloscope to TP106(PB.FM) of the main board assembly and to TP111(D.FF) of the main board assembly for external sync connection.
(2) Play the alignment tape (SP) and observe the FM waveforms.
(3) Press the channel buttons (▲, ▼) simultaneously during playback to enter the manual tracking mode. (This also brings tracking to the centre.)
(4) Loosen screws (4) and (5) so that the A/C head position bit is set as indicated in Fig.2-3-6.
(5) Turn the A/C head position bit fully toward the capstan. Then turn it back gradually toward the drum and stop on the second peak point position of the FM waveform output level. Then tighten the screw (4) temporarily.
(6) Then play the alignment tape MHPE-L.
(7) Press the channel buttons (▲, ▼) simultaneously during playback to enter the manual tracking mode. (This also brings the tracking to the centre.)
(8) Perform the tracking operation and make sure that the FM waveform is at its maximum.
(9) If it is not at maximum, loosen the temporarily tightened the screw (4) and turn the A/C head position bit to bring the audio control head to a position, around where the waveform reaches its maximum for the first time. Then tighten the screws (4) and (5).

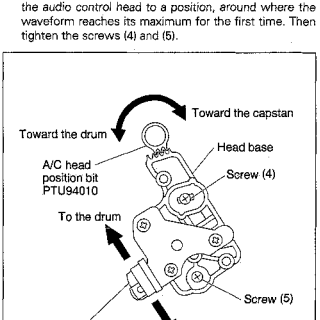


Fig. 2-3-6

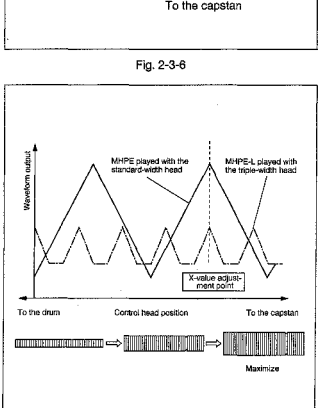


Fig. 2-3-7

2.3.4 Checking/Adjustment of the Tension Pole

(1) Check the back tension cassette gauge to make sure that the indicator points to 25 - 51 gf•cm.
(2) If the indicated value is outside this range, carry out the following adjustment steps.
  1) Select the mechanism servicing mode. (See 1.5 MECHANISM SERVICE MODE.)
  2) While in the Play mode, turn the adjustment pin with a straight-slot screwdriver while taking care not to touch the 2.5 mm dia. pole. (See Fig.2-3-8.)

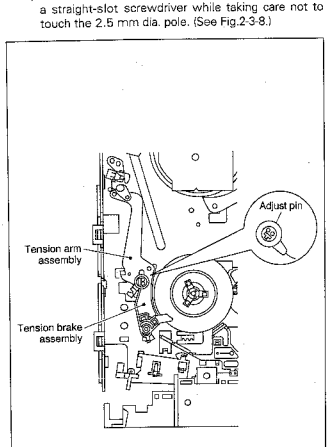


Fig. 2-3-8

2.3.5 Adjustment of the Tension Stud

(1) Adjust so that the left side of the tension stud is on the extension of the notch line of the main deck. (See Fig. 2-3-9.)

Note: *Adjustment is not usually necessary for the tension stud. Perform this adjustment only when it is out of position.*

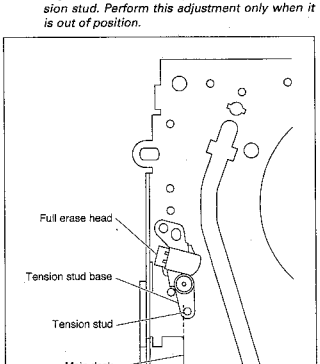


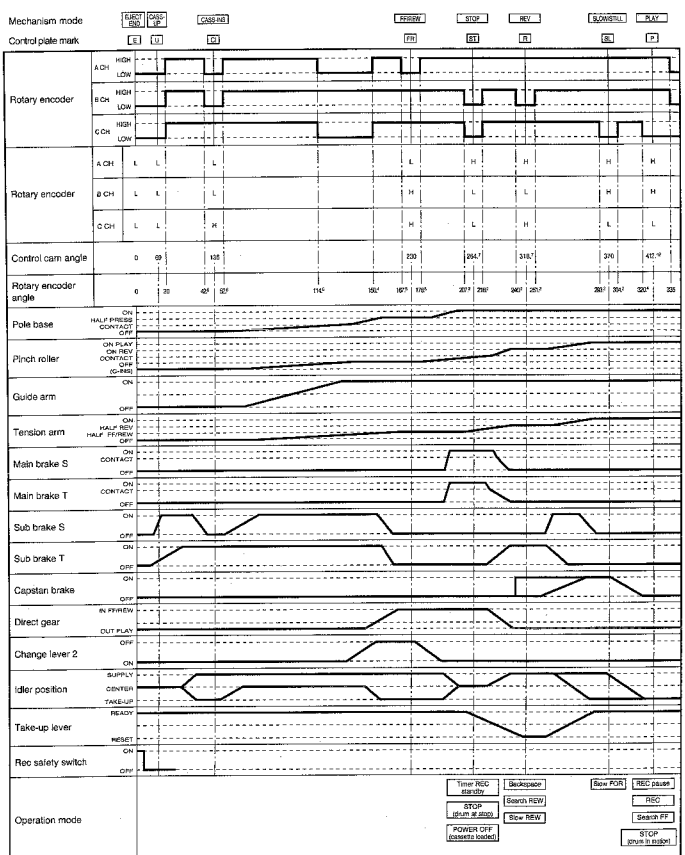
Fig. 2-3-9

2.3.6 Main Brake Torque Adjustment

Note: Adjustment of the main brake torque is required after the adjustment pin has been removed or the main brake assembly or the reel disk on the supply or take-up side have been replaced, removed or attached.

(1) Rotate the pulley of the loading motor by hand to align the mark ▼ on the loading arm gear shaft with the ST marking on the control plate (i.e. set to the STOP mode position).
(2) Insert a torque gauge into the reel disk on the side to be played, hold the torque gauge lightly, rotate it clockwise when measuring the supply side torque or counterclockwise when measuring the take-up side torque, and read the value indicated at the moment the reel disk starts to slip.
(3) Make sure that the main brake torque values on the supply and take-up sides are both between 23.5 — 78.4×10^{-3} N•m (240 — 800 gf•cm). If the value is outside the specified range, adjust to the specified value by rotating the adjustment pin.
If an adjustment by using the adjustment pin is not possible, replace the main brake assembly.

Mechanism Timing Chart



SECTION 3
ELECTRICAL ADJUSTMENT

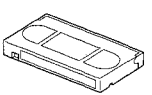
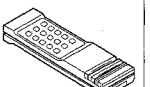
3.1 PRECAUTION

Electrical adjustment are required after replacing circuit components and certain mechanical parts. It is important to perform these adjustments only after all repairs and replacements have been completed. Also do not attempt these adjustments unless the proper equipments is available.

3.1.1 Required test equipment

① Colour television or monitor
② Oscilloscope: wide-band,dual-trace,triggered delayed sweep
③ Frequency counter
④ Signal generator: RF/IF sweep/marker
⑤ Signal generator: PAL colour bar, stairstep
⑥ Recording tape
⑦ Digit-key remote controller(provided)

3.1.2 Required adjustment tools

Alignment tape (SP,stairstep) 4822 397 30262	Presetting unit 4822 395 90915
	

3.1.3 Colour bar signal,colour bar pattern

● PAL colour bar signal

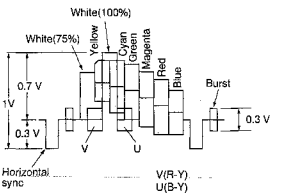


Fig. 3-1-1 PAL colour bar signal waveform

● PAL colour bar pattern

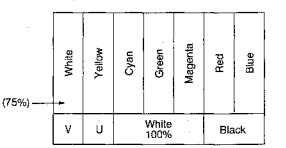


Fig. 3-1-2 PAL colour bar pattern

Note:

The system control circuit of this model has an automatic recognition about the ON-OFF control of the ***DOCTOR SYSTEM.***

3.2 SERVO CIRCUIT

Notes: • ***Unless otherwise specified,all measurement point and adjustment parts are located on the MAIN BOARD.***
• ***Depress the "A" button on the presetting unit to the VCR to "code receive" mode.***

3.2.1 PB switching point

Signal	• Alignment tape SP ,Stairstep
Mode	• PB • Automatic tracking OFF
Equipment	• Oscilloscope
Measurement point	• VIDEO OUT TERMINAL
Trigger slope (–)	• TP111(D. FF)
Adjustment tool	• Presetting unit
Specification	• 6.5 ± 0.5H

Note: • ***Use only the "O" button, depressing other buttons during adjustment may cause adjustment errors.***

(1) Connect an oscilloscope to VIDEO OUT TERMINAL and external trigger from TP111 (negative slope).
(2) Playback the stairstep signal of the alignment tape.
(3) Press the "O" button of the presetting unit.
The adjustment is performed automatically. Once the adjustment is performed, the VCR will go into the STOP mode.
(4) Playback the alignment tape again, confirm the switching point (See Fig.3-2-2).

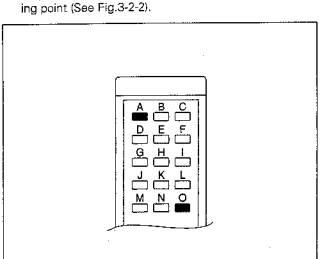


Fig. 3-2-1 Presetting unit

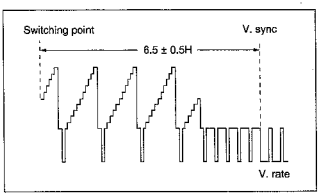


Fig. 3-2-2 PB switching point

3.2.2 Slow tracking preset

Signal	• Tuner or colour bar
Mode	• LP, REC → PB(SLOW) • Automatic tracking OFF
Equipment	• TV-Monitor
Adjustment tool	• Presetting unit
Specification	• Minimum noise

Note: • ***Use only the "B" and "C" buttons, depressing other buttons during adjustment may cause adjustment errors.***

(1) Record a colour bar signal in the LP mode.
(2) Playback the recorded signal on the FWD slow mode.
(3) Set the tracking control to the centre position by simultaneously pressing the CH "▲" and "▼" buttons.
(4) Observe the display on the TV monitor and adjust for optimum noise condition (best tracking) by depressing the "B " or "C " buttons of the presetting unit.
(5) Depress the STOP button.
(6) Confirm that the bar noise is not visible on the TV monitor in the slow mode.
(7) Repeat steps (2) to (6) in the REV slow mode.

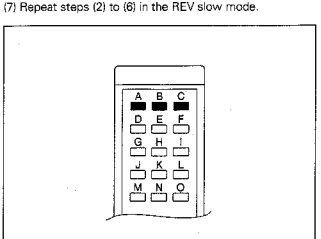


Fig. 3-2-3 Presetting unit

3.3 SYSCON CIRCUIT

Notes: • ***Unless otherwise specified,all measurement point and adjustment parts are located on the MAIN BOARD.***
• ***When perform this adjustment,remove the MECHANISM assembly.***

3.3.1 Timer clock

Signal	• No signal
Mode	• EE
Equipment	• Frequency counter
Measurement point	• IC3001-PIN61
Adjustment part	• C3025 (TIMER CLOCK)
Specification	• 1024.008 ± 0.001 Hz [976.5549 ± 0.0010 µsec.]

(1) Connect the frequency counter to IC3001-PIN61.
(2) Connect the short wire between IC3001-PIN24 and Vcc(5V).
(3) Short the leads of capacitor C3026 once in order to reset IC3001.
(4) Disconnect the short wire between IC3001-PIN24 and Vcc then connect it again.
(5) Adjust C3025 trimmer capacitor so that the output from IC3001-PIN61 falls within 1024.008 ± 0.001 Hz (976.5549 ± 0.0010 µsec.) range.

SECTION 4
CHARTS AND DIAGRAMS

NOTES OF SCHEMATIC DIAGRAM

Safety precautions
The Components identified by the symbol ⚠ are critical for safety. For continued safety, replace safety critical components only with manufacturer's recommended parts.

1. Units of components on the schematic diagram

Unless otherwise specified.

1) All resistance values are in ohm, 1/6 W, 1/8 W (refer to parts list).
   Chip resistors are 1/16 W.
   K: K (1000), M: M (1000K)
2) All capacitance values are in μF, (P: PF).
3) All inductance values are in μH, (m: mH).
4) All diodes are 1SS133, MA165 or 1N4148M (refer to parts list).

2. Indications of control voltage

AUX : Active at high

$\overline{AUX}$ or AUX(L) : Active at low

3. Interpreting Connector indications

Removable connector

Wire soldered directly on board

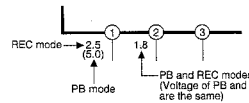
Non-removable Board connector

Board to Board

Connected pattern on board
The arrows indicate signal path

4. Voltage measurement

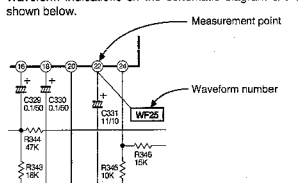
1) Video circuits
   REC : Colour bar signal in SP mode, normal VHS mode
   PB : Alignment tape, colour bar SP mode, normal VHS mode
   — : Unmeasurable or unnecessary to measure
2) Audio circuits
   REC : 1KHz, –8 dBs sine wave signal in SP mode, Normal VHS mode
   PB : REC then playback it
3) Movie Camera circuits
   Measured using a correctly illuminated gray scale or colour bar test chatrs in the E-E mode
4) Indication on schematic diagram
   Voltage Indications for REC and PB mode on the schematic diagram are as shown below.



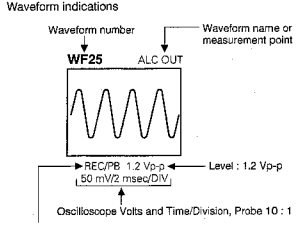
Note: If the voltages are not indicated on the schematic diagram, refer to the voltage charts.

5. Waveform measurement

1) Video circuits
   REC : Colour bar signal in SP mode, normal VHS mode
   PB : Alignment tape, colour bar SP mode, normal VHS mode
2) Audio circuits
   REC : 1KHz, –8 dBs sine wave signal in SP mode, normal VHS mode
   PB : REC then playback it
3) Movie Camera circuits
   Measured using a correctly illuminated gray scale or colour bar test chatrs in the E-E mode
4) Indication on schematic diagram
   Waveform indications on the schematic diagram are as shown below.

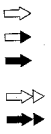


5) Waveform indications



6. Signal path Symbols

The arrows indicate the signal path as follows.



Playback signal path

Playback and recording signal path

Recording signal path (including E-E signal path)

Capstan servo path

Drum servo path

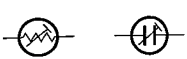
(Example)

Playback R-Y signal path

Recording Y signal path

7. Indication of the parts for adjustments

The parts for the adjustments are surrounded with the circle as shown below.



8. Indication of the parts not mounted on the circuit board

"OPEN" is indicated by the parts not mounted on the circuit board.

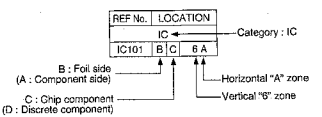
CIRCUIT BOARD NOTES

1. Foil and Component sides

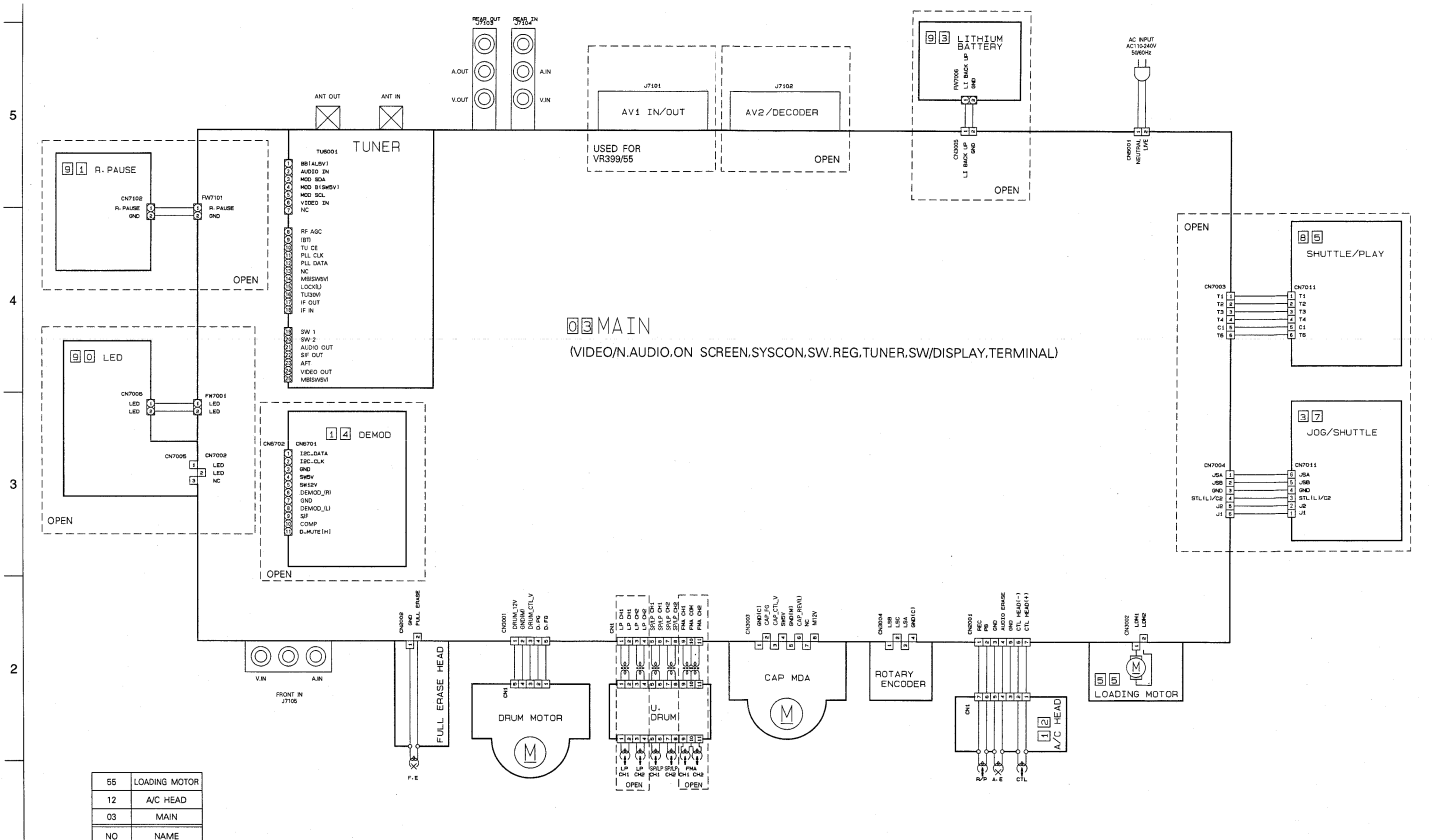
1) Foil side (B side) :
   Parts on the foil side seen from foil face (pattern face) are indicated.
2) Component side (A side) :
   Parts on the component side seen from component face (parts face) indicated.

2. Parts location guides

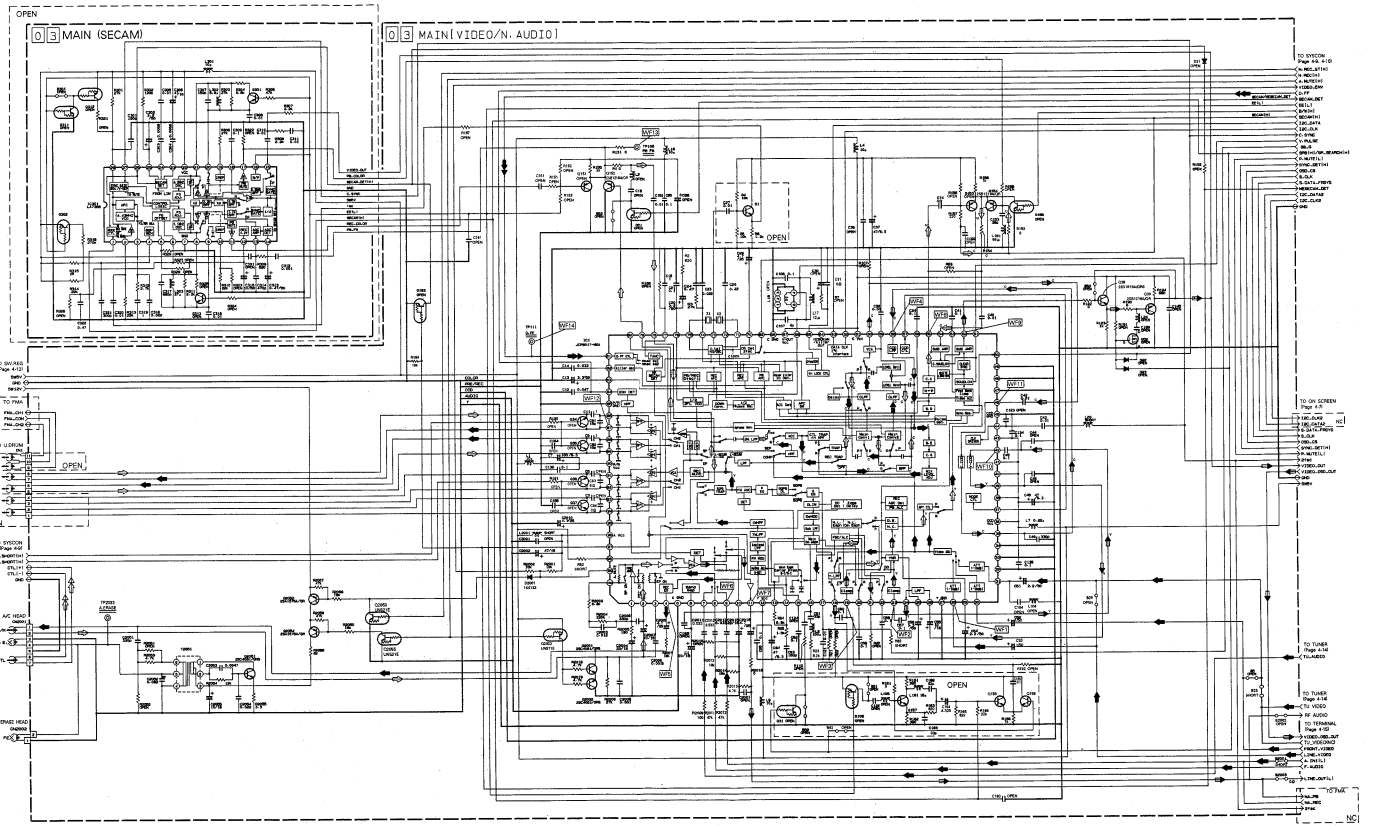
Parts location are indicated by guide scale on the circuit board.



4.1 BOARD INTERCONNECTIONS

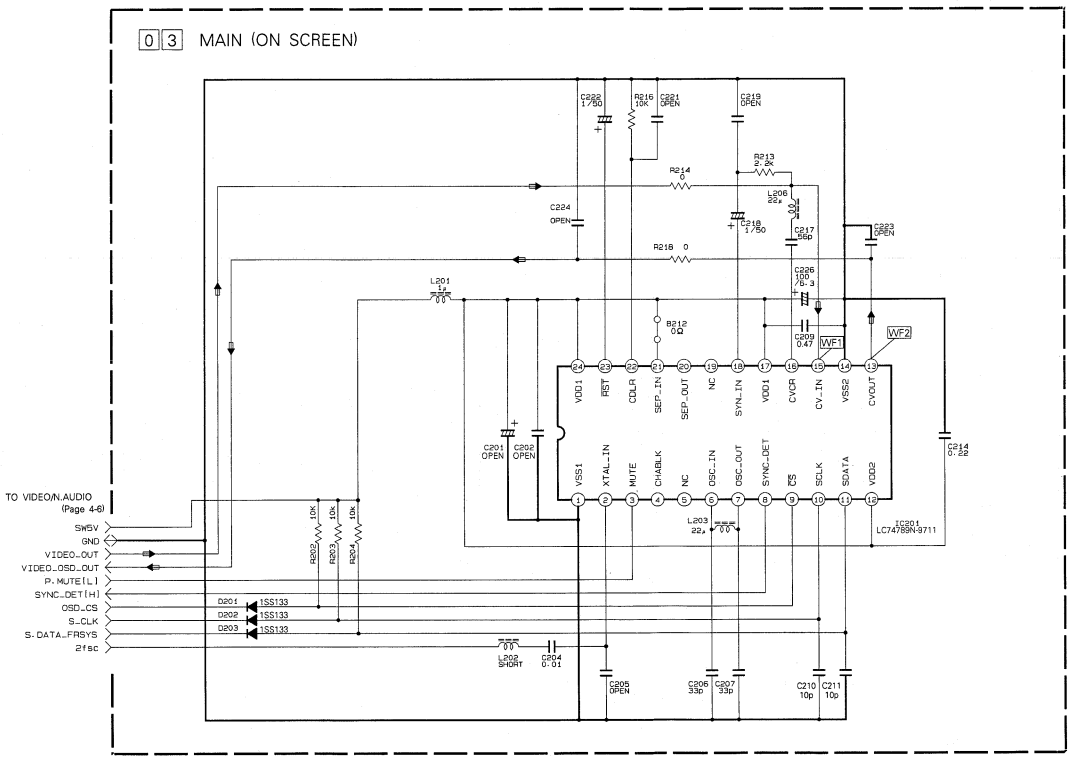


4.2 VIDEO/N.AUDIO SCHEMATIC DIAGRAM



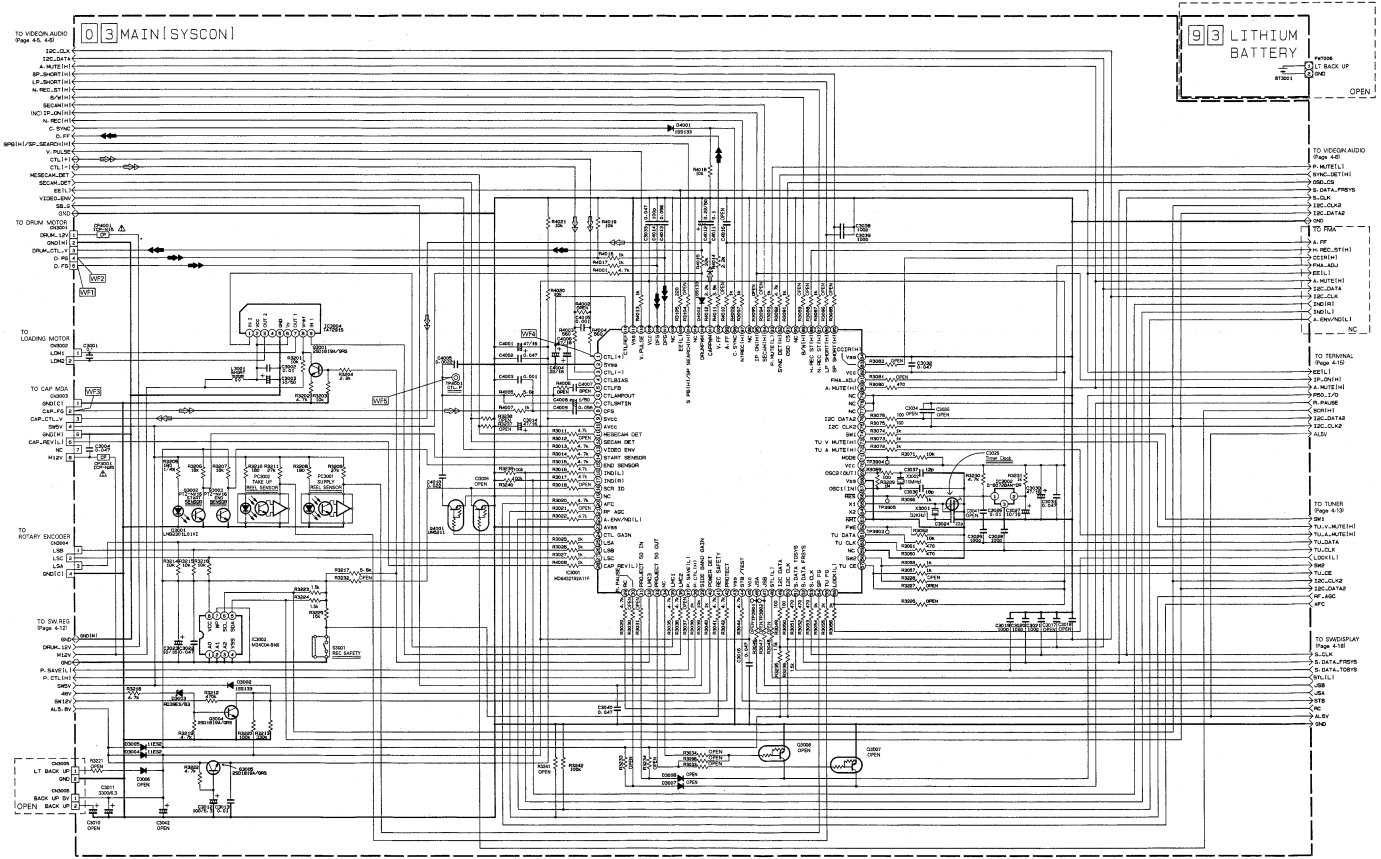
NOTE : For VIDEO/N.AUDIO waveforms, please refer to page 4-19.

4.3 ON SCREEN SCHEMATIC DIAGRAM



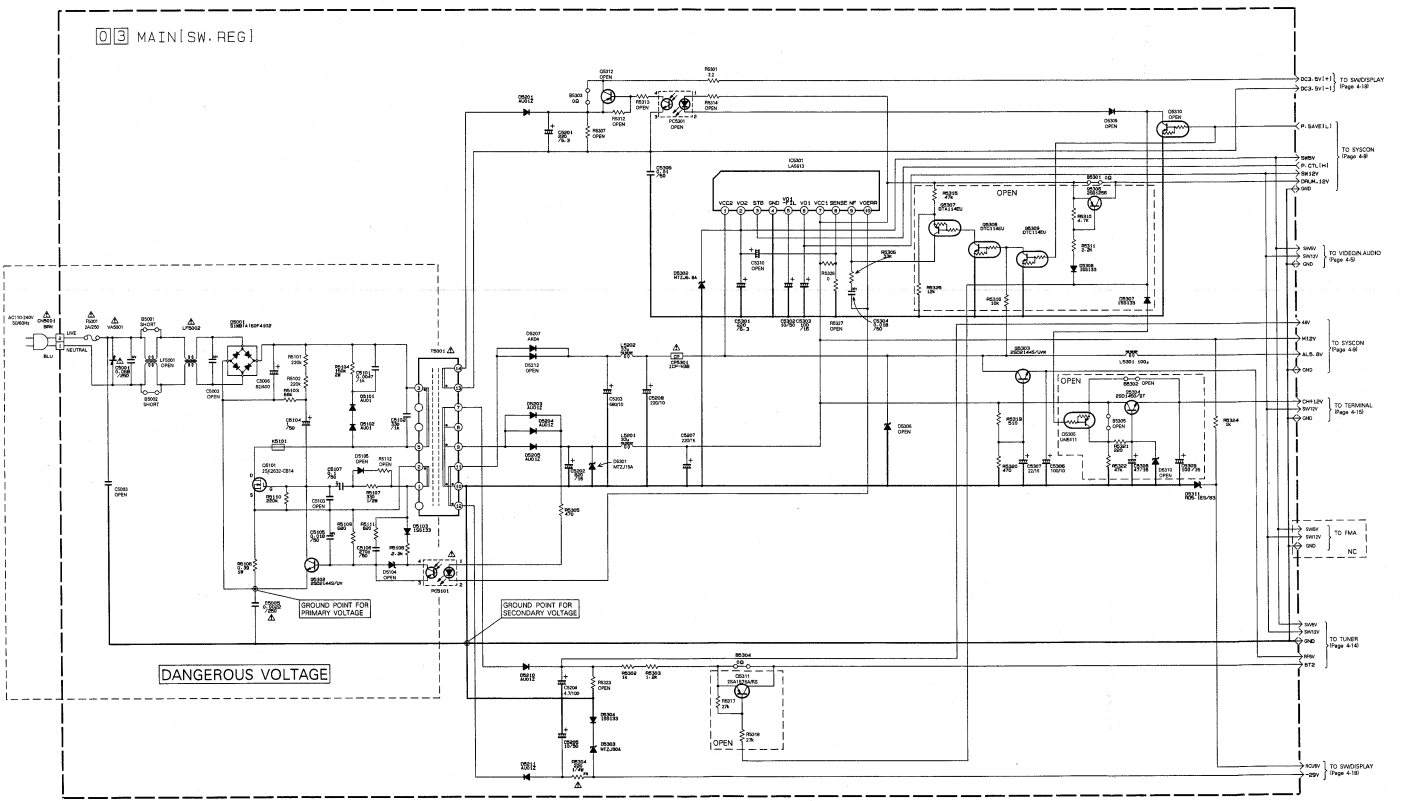
NOTE: For ON SCREEN waveforms, please refer to page 4-19.

4.4 SYSTEM CONTROL SCHEMATIC DIAGRAM

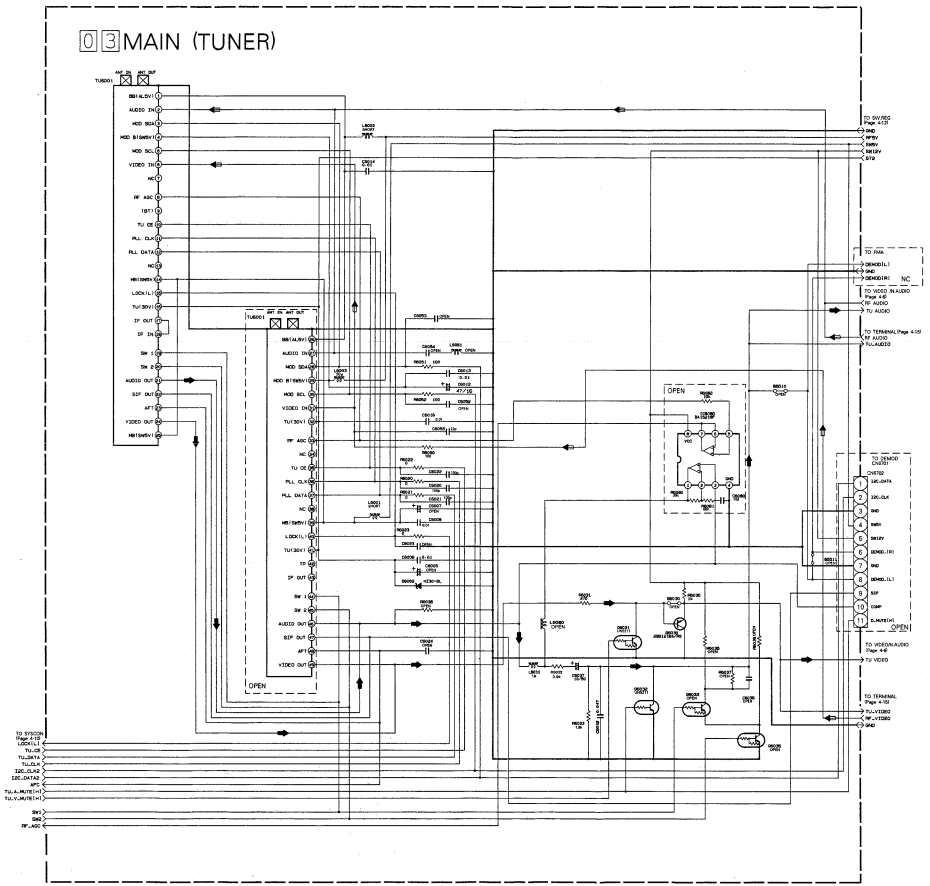


NOTES : 1. For SYSCON waveforms, please refer to page 4-19.
2. The SYSTEM CONTROL circuit of this model has an automatic recognition about the ON-OFF control of the DOCTOR SYSTEM.

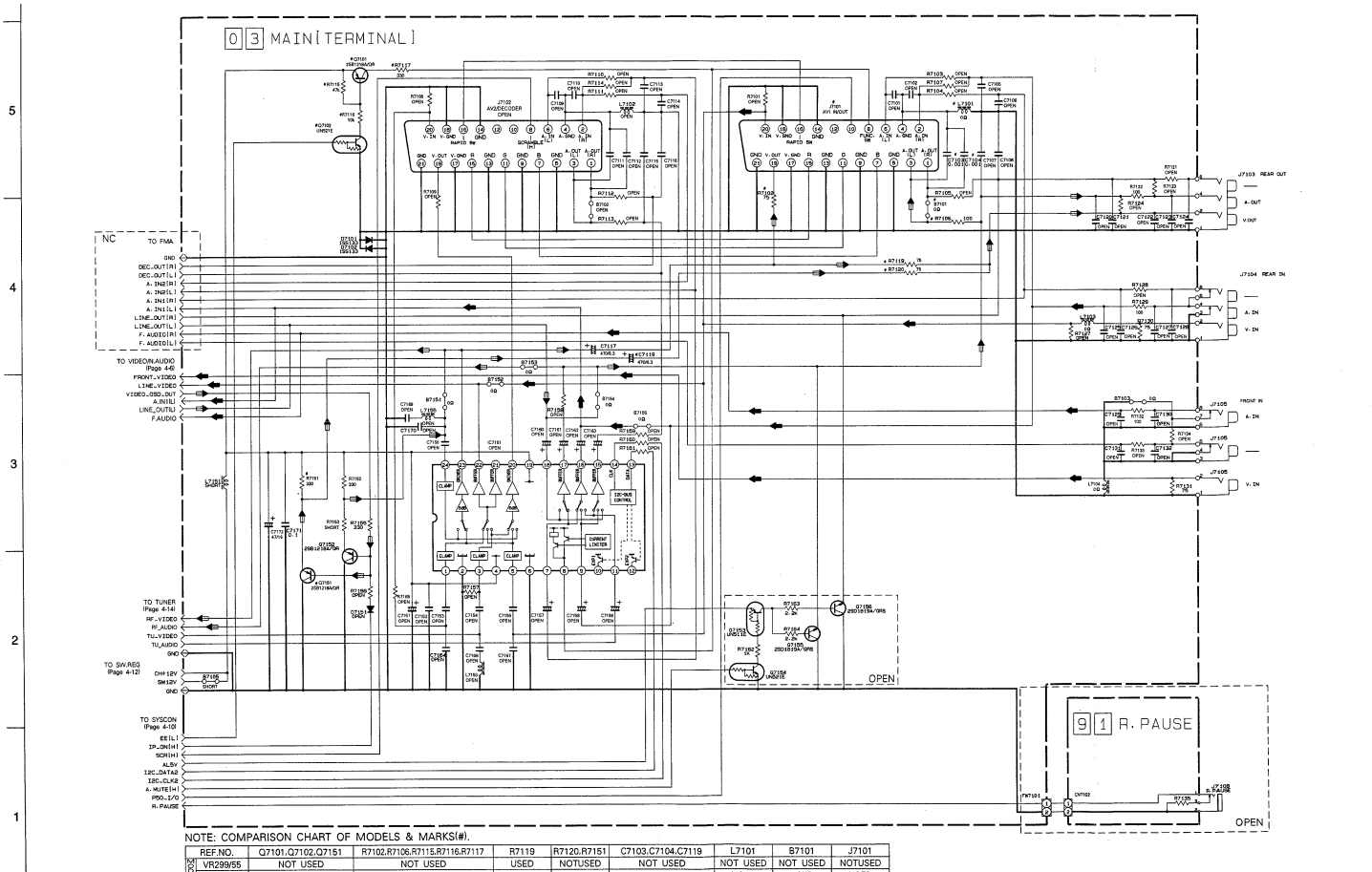
4.5 SWITCHING REGULATOR SCHEMATIC DIAGRAM



4.6 TUNER SCHEMATIC DIAGRAM



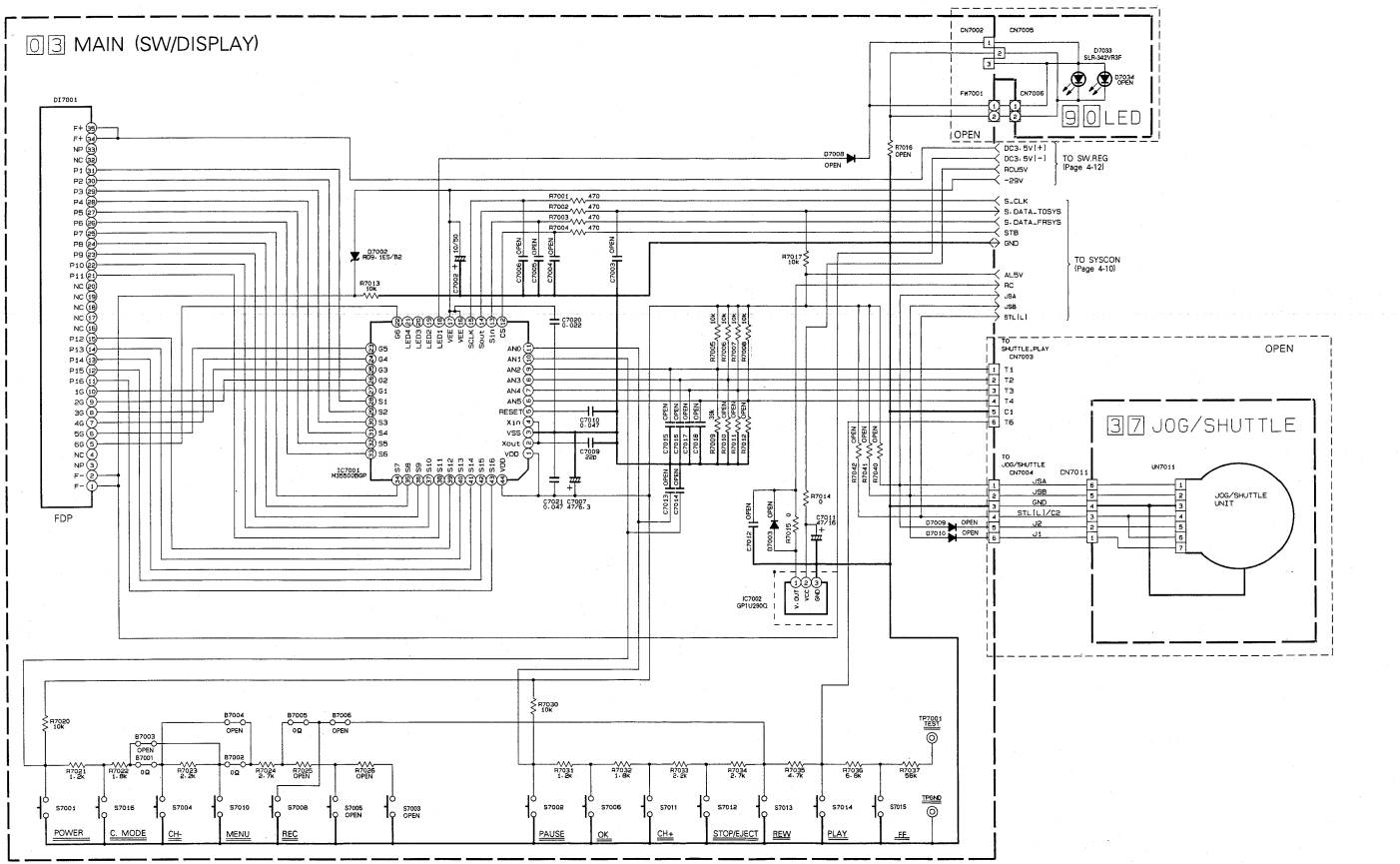
4.7 TERMINAL SCHEMATIC DIAGRAM



NOTE: COMPARISON CHART OF MODELS & MARKS(#).

MODEL	REF.NO.	Q7101,Q7102,Q7151	R7102,R7106,R7115,R7116,R7117	R7119	R7120,R7151	C7103,C7104,C7119	L7101	B7101	J7101
	VR299/55	NOT USED	NOT USED	USED	NOTUSED	NOT USED	NOT USED	NOT USED	NOTUSED
	VR399/55	USED	USED	NOT USED	USED	USED	USED	USED	USED

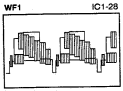
4.8 SW/DISPLAY SCHEMATIC DIAGRAM



WAVEFORMS

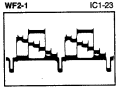
— VIDEO/N.AUDIO —

WF1 IC1-28



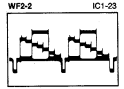
REC 0.88 Vp-p
50 mV/20 µsec/DIV

WF2-1 IC1-23



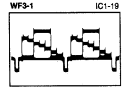
REC 0.47 Vp-p
20 mV/20 µsec/DIV

WF2-2 IC1-23



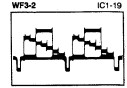
PB 0.54 Vp-p
20 mV/20 µsec/DIV

WF3-1 IC1-19



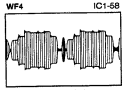
REC 0.5 Vp-p
20 mV/20 µsec/DIV

WF3-2 IC1-19



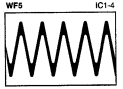
PB 0.56 Vp-p
20 mV/20 µsec/DIV

WF4 IC1-58



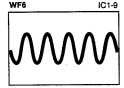
REC/PB 0.56 Vp-p
20 mV/20 µsec/DIV

WF5 IC1-4



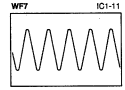
REC 1.2 Vp-p
20 mV/0.5 msec/DIV

WF6 IC1-9



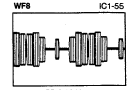
REC 0.17 Vp-p
5 mV/0.5 msec/DIV

WF7 IC1-11



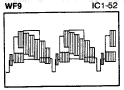
PB 0.9 Vp-p
20 mV/0.5 msec/DIV

WF8 IC1-55



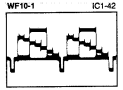
PB 0.58 Vp-p
20 mV/20 µsec/DIV

WF9 IC1-52



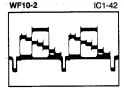
REC/PB 2.2 Vp-p
0.1 V/20 µsec/DIV

WF10-1 IC1-42



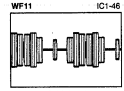
REC 0.4 Vp-p
10 mV/20 µsec/DIV

WF10-2 IC1-42



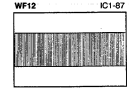
PB 0.46 Vp-p
10 mV/20 µsec/DIV

WF11 IC1-46



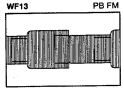
REC/PB 0.4 Vp-p
10 mV/20 µsec/DIV

WF12 IC1-87



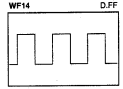
REC 1.8 Vp-p
50 mV/1 msec/DIV

WF13 TP106 PB FM



PB 0.5 Vp-p
20 mV/1 msec/DIV

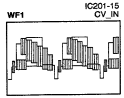
WF14 TP111 D.FF



REC/PB 5.1 Vp-p
0.2 V/10 msec/DIV

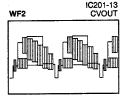
— ON SCREEN —

WF1 IC201-15 CV_IN



REC/PB 2.2 Vp-p
50 mV/20 µsec/DIV

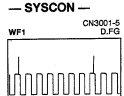
WF2 IC201-13 CVOUT



REC/PB 2.2 Vp-p
50 mV/20 µsec/DIV

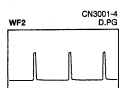
— SYSCON —

WF1 CN3001-5 D.FG



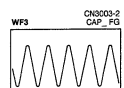
REC/PB 4.4 Vp-p
0.2 V/5 msec/DIV

WF2 CN3001-4 D.PG



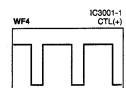
REC/PB 4.6 Vp-p
0.2 V/10 msec/DIV

WF3 CN3003-2 CAP_FG



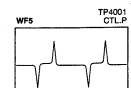
REC/PB 2.2 Vp-p
50 mV/0.5 msec/DIV

WF4 IC3001-1 CTL(+)



REC 4.0 Vp-p
0.1 V/10 msec/DIV

WF5 TP4001 CTL_P



PB 2.6 Vp-p
50 mV/10 msec/DIV

COMPONENT PARTS LOCATION GUIDE <MAIN>

REF.NO.	LOCATION
CAPACITOR	
C01	B C 11N
C02	B C 13C
C03	B C 13N
C04	B C 13C
C09	B C 13N
C11	B C 13M
C12	B C 13M
C13	B C 13M
C14	B C 13L
C16	B C 14L
C20	B C 13K
C21	B C 13K
C23	B C 13J
C24	B C 14K
C25	B C 14K
C27	B C 13J
C29	A B 13D
C30	B C 13K
C32	B C 12K
C34	A B 11K
C36	A B 12L
C37	A B 12K
C40	B C 12K
C41	B C 11K
C42	B C 10J
C43	B C 11K
C44	B C 11K
C45	B C 10K
C46	B C 10K
C48	B C 10L
C49	B C 10L
C51	A B 10L
C52	B C 10L
C53	A B 10M
C54	A B 10M
C55	A B 10M
C56	A B 10M
C57	A B 10M
C58	A B 10M
C59	A B 9M
C60	A B 9M
C61	B C 10N
C62	B C 10N
C63	A B 11N
C64	A B 11N
C73	A B 11N
C74	A B 12N
C81	A B 13N
C82	A B 13N
C83	A B 13N
C84	A B 13N
C85	A B 14L
C86	A B 14L
C87	A B 10L
C88	A B 10L
C89	A B 9M
C104	A B 10L
C105	A B 10L
C106	A B 9M
C107	A B 9M
C122	A B 9K
C123	A B 11K
C124	A B 10N
C134	A B 11L
C135	A B 11L
C144	A B 11K
C145	A B 11K
C151	A B 9K
C152	A B 13M
C153	A B 9L
C154	A B 9L
C155	A B 9K
C164	A B 13N
C165	A B 14N
C166	A B 11N
C167	A B 11K
C168	A B 9K
C192	A B 9K
C193	A B 9K
C203	A B 220F
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C294	A B 7J
C295	A B 7J
C296	A B 7J
C297	A B 7J
C298	A B 7J
C299	A B 7J
C2001	A D 11O
C2002	A D 12O
C2003	A D 12O
C2004	A D 11O

REF.NO.	LOCATION
C5501	A D 8E
C5502	A D 8E
C5503	A D 8E
C5504	A D 8E
C5506	A D 5D
C5508	A D 4D
C5507	A D 4D
C5509	A D 4D
C5510	A D 4D
C5511	A D 4D
C5512	A D 4D
C6005	A D 20N
C6006	A D 20N
C6007	A D 20N
C6008	A D 20N
C6013	A D 21N
C6014	A D 21N
C6015	A D 21N
C6020	A D 22N
C6021	A D 22N
C6022	A D 22N
C6023	A D 21K
C6024	A D 21K
C6032	A D 21I
C6036	A D 21I
C6037	A D 22M
C6052	A D 22O
C6053	A D 21O
C6054	A D 21O
C6055	A D 22O
C5080	A D 21J
C7002	A D 10B
C7003	A D 10B
C7004	A D 10B
C7005	A D 10B
C7006	A D 10B
C7007	A D 13B
C7010	A D 13B
C7012	A D 9B
C7013	A D 17C
C7014	A D 14A
C7015	A D 14A
C7016	A D 14A
C7017	A D 17F
C7018	A D 17F
C7019	A D 17F
C7020	A D 17F
C7021	A D 17F
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C7114	A D 17F
C7115	A D 17F
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C7117	A D 17F
C7118	A D 17F
C7120	A D 17F
C7121	A D 17F
C7123	A D 17F
C7124	A D 17F
C7125	A D 17F
C7126	A D 17F
C7127	A D 17F
C7128	A D 17F
C7129	A D 17F
C7130	A D 17F
C7131	A D 17F
C7132	A D 17F
C7133	A D 17F
C7134	A D 17F
C7135	A D 17F
C7136	A D 17F
C7137	A D 17F
C7138	A D 17F
C7139	A D 17F
C7140	A D 17F
C7141	A D 17F
C7142	A D 17F
C7143	A D 17F
C7144	A D 17F
C7145	A D 17F
C7146	A D 17F
C7147	A D 17F
C7148	A D 17F
C7149	A D 17F
C7150	A D 17F
C7151	A D 17F

REF.NO.	LOCATION
CONNECTOR	
CN1	A D 14O
CN2001	A D 10O
CN3001	A D 9K
CN3002	A D 9K
CN3003	A D 7L
CN3004	A D 7K
CN3005	A D 10P
CN5001	A D 8E
CN7002	A D 16A
CN7004	A D 20K
DIODE	
D21	A D 8K
D22	A D 8K
D101	A D 11J
D102	A D 15J
D202	A D 19G
D203	A D 19G
D2001	A D 15P
D2002	A D 15P
D2201	A D 19G
D2202	A D 19G
D3001	A D 9C
D3002	A D 9C
D3003	A D 9C
D3004	A D 9C
D3005	A D 9C
D3006	A D 9C
D3007	A D 10E
D3008	A D 10E
D4001	A D 14G
D4002	A D 14G
D5001	B C 2M
D5101	A D 4D
D5102	A D 3K
D5103	A D 3L
D5104	A D 3M
D5105	A D 3L
D5201	A D 21H
D5203	A D 22M
D5204	A D 21H
D5205	A D 22M
D5207	A D 21O
D5210	A D 21H
D5211	A D 21H
D6021	A D 21F
D6012	A D 22N
D6301	A D 21F
D6302	A D 21F
D6303	A D 21F
D6304	A D 21K
D6305	A D 21K
D6307	A D 21I
D6308	A D 21I
D6309	A D 22O
D5310	A D 4H
D6310	A D 21O
D6002	A D 21M
D6003	A D 21M
D7000	A D 9B
D7008	A D 9B
D7009	A D 5B
D7010	A D 5B
D7101	A D 17O
D7102	A D 17O
D7107	A D 17M
D7151	A D 19M

REF.NO.	LOCATION
IC	
IC1	B C 12M
IC201	A D 19F
IC2001	B C 16M
IC2201	A D 16M
IC3001	B C 14K
IC3002	B C 15E
IC3003	B C 15E
IC3004	A D 7F
IC5001	B C 8E
IC5081	A D 4J
IC6001	B C 22B
IC6002	B C 22B
IC7034	A D 17F
IC7151	A D 20K
JACK	
J7101	A D 16P
J7102	A D 20P
J7103	A D 20P
J7104	A D 20P
J7105	A D 20A
COIL	
L1	A D 12O
L2	A D 14J
L7	A D 14J
L8	A D 14J
L9	A D 14J
L10	A D 13K
L11	A D 13K
L12	A D 13K
L13	A D 13K
L14	A D 13K
L106	A D 9K
L181	A D 9K
L182	A D 9K
L202	A D 19E
L203	A D 19F
L204	A D 19F
L301	A D 9K
L302	A D 9K
L303	A D 7J
L2001	A D 15P
L2201	A D 19G
L2202	A D 19G
L3001	A D 9K
L5201	A D 3G
L5301	A D 4D
L5302	A D 21O
L6002	A D 21O
L6031	A D 21I
L6032	A D 21I
L6080	A D 23J
L7101	A D 13P
L7102	A D 13P
L7103	A D 20A
L7104	A D 20A
L7153	A D 20K
L7154	A D 20K
TRANSISTOR	
Q1	B C 13J
Q201	A D 19F
Q3	B C 13N
Q34	B C 13N
Q35	B C 13N
Q36	B C 13N
Q37	B C 13N
Q38	B C 13N
Q39	B C 13N
Q51	B C 14M
Q52	B C 14M
Q105	A D 9L
Q106	A D 9L
Q107	A D 11K
Q151	A D 9K
Q152	A D 9K
Q153	A D 9K
Q154	A D 9K
Q155	A D 9K
Q156	A D 9K
Q157	A D 9K
Q158	A D 9K
Q159	A D 9K
Q160	A D 9K
Q161	A D 9K
Q162	A D 9K
Q163	A D 9K
Q164	A D 9K
Q165	A D 9K
Q166	A D 9K
Q167	A D 9K
Q168	A D 9K
Q169	A D 9K
Q170	A D 9K
Q171	A D 9K
Q172	A D 9K
Q173	A D 9K
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Q176	A D 9K
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Q178	A D 9K
Q179	A D 9K
Q180	A D 9K
Q181	A D 9K
Q182	A D 9K
Q183	A D 9K
Q184	A D 9K
Q185	A D 9K
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Q233	A D 9K
Q234	A D 9K
Q235	A D 9K
Q252	A D 9K
Q253	A D 9K
Q254	A D 9K
Q255	A D 9K
Q256	A D 9K
Q257	A D 9K
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Q259	A D 9K
Q260	A D 9K
Q261	A D 9K
Q262	A D 9K
Q263	A D 9K
Q264	A D 9K
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Q266	A D 9K
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Q285	A D 9K
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Q288	A D 9K
Q289	A D 9K
Q290	A D 9K
Q291	A D 9K
Q292	A D 9K
Q293	A D 9K

REF.NO.	LOCATION
RESISTOR	
R1	B C 13M
R2	B C 13K
R3	B C 13K
R4	B C 13K
R5	B C 13K
R6	B C 13K
R7	B C 13K
R8	B C 13K
R21	A D 20A
R22	A D 20A
R23	A D 9N
R24	A D 10N
R25	A D 10N
R26	A D 9L
R27	A D 9L
R28	A D 9L
R29	A D 9L
R102	A D 9K
R103	A D 9K
R110	A D 10N
R120	A D 13K
R121	A D 13K
R122	A D 13K
R123	A D 13K
R124	A D 13K
R131	A D 9K
R132	A D 9K
R133	A D 9K
R134	A D 9K
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R137	A D 9K
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R322	A D 9K
R323	A D 9K
R324	A D 9K
R325	A D 9K
R326	A D 9K
R327	A D 9K

REF.NO.	LOCATION
R328	B C 7L
R2095	B C 7J
R2097	B C 12O
R2098	B C 9L
R3104	B C 14G
R3105	B C 14G
R3107	B C 6M
R3202	B C 6M
R3203	B C 6M
R3204	B C 6M
R3205	B C 11H
R3206	B C 8B
R3207	B C 16B
R3208	B C 18F
R3209	B C 9J
R3211	B C 8G
R3212	B C 8G
R3213	B C 7F
R3214	B C 7F
R3215	B C 9E
R3216	B C 9E
R3217	B C 9F
R3218	B C 9F
R3219	B C 9O
R3220	B C 9O
R3221	B C 5D
R3222	B C 5D
R3223	B C 16E
R3224	B C 16E
R3225	B C 17E
R3226	B C 17E
R3227	B C 14D
R3228	B C 14D
R3229	B C 17E
R3230	B C 15E
R3231	B C 15E
R3232	B C 15E
R3233	B C 15E
R3234	B C 15E
R3235	B C 15E
R3236	B C 15E
R3237	B C 15E
R3238	B C 8H
R3239	B C 8H
R3240	B C 13J
R3241	B C 11F
R3242	B C 9J
R3243	B C 9J
R4001	B C 12G
R4002	B C 12G
R4003	B C 12G
R4004	B C 12G
R4005	B C 12G
R4006	B C 9G
R4007	B C 9G
R4008	B C 10F
R4009	B C 10F
R4010	B C 14G
R4011	B C 14G
R4012	B C 14G
R4013	B C 14G
R4014	B C 14G
R4015	B C 14G
R4016	B C 13G
R4017	B C 13G
R4018	B C 13G
R4019	B C 13G
R4020	B C 7G
R4021	B C 7G
R5101	A D 3M
R5102	A D 3M
R5103	A D 3M
R5104	A D 2K
R5105	A D 2K
R5106	A D 2K
R5107	A D 2K
R5108	A D 2K
R5109	A D 2K
R5110	A D 2K
R5111	A D 2K
R5112	A D 2K
R5301	A D 4F
R5302	A D 4F
R5303	A D 4F
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R5306	A D 4E
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R5313	A D 1E
R5314	A D 2E
R5315	A D 2E
R5316	A D 3E
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R5320	A D 3D
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R5322	A D 3D
R5323	A D 3D
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R5331	A D 3D
R5332	A D 3D
R5333	A D 3D
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R5337	A D 3D
R5338	A D 3D
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R5342	A D 3D
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R5346	A D 3D
R5347	A D 3D
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R5388	A D 3D
R5389	A D 3D
R5390	A D 3D
R5391	A D 3D
R5392	A D 3D
R5393	A D 3D

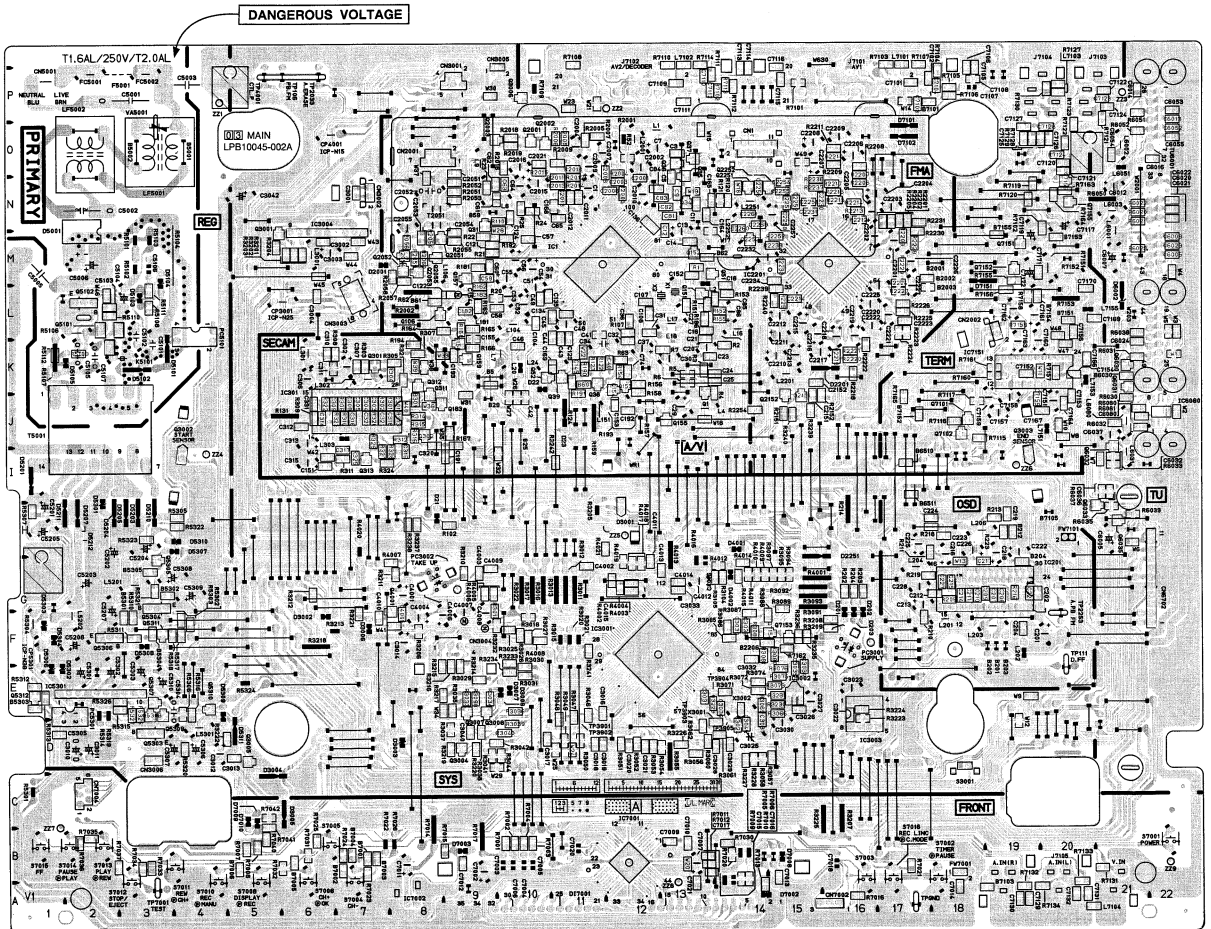
REF.NO.	LOCATION
R7012	B C 13B
R7013	B C 14B
R7014	B C 8B
R7015	B C 9B
R7016	B C 16A
R7017	B C 14B
R7020	B C 14B
R7021	B C 7B
R7022	B C 7B
R7023	B C 7B
R7024	B C 7B
R7025	B C 8B
R7026	B C 8B
R7030	B C 14A
R7031	B C 6B
R7032	B C 9B
R7033	B C 9B
R7034	B C 9B
R7035	B C 9B
R7036	B C 9B
R7037	B C 9B
R7041	B C 5B
R7042	B C 5B
R7101	B C 16M
R7102	B C 17M
R7103	B C 18P
R7104	B C 18P
R7105	B C 18P
R7106	B C 18P
R7107	B C 18P
R7108	B C 18P
R7109	B C 18P
R7110	B C 13P
R7111	B C 14P
R7112	B C 14P
R7113	B C 14P
R7114	B C 14P
R7115	B C 14P
R7116	B C 14P
R7117	B C 14P
R7118	B C 19N
R7119	B C 19N
R7120	B C 19N
R7121	B C 20O
R7122	B C 20O
R7123	B C 20O
R7124	B C 20O
R7125	B C 20O
R7126	B C 19O
R7127	B C 19O
R7128	B C 19O
R7129	B C 19O
R7130	B C 19O
R7131	B C 21B
R7132	B C 20A
R7133	B C 20A
R7134	B C 20M
R7135	B C 20M
R7151	B C 20L
R7152	B C 19K
R7153	B C 19K
R7154	B C 19K
R7155	B C 19K
R7156	B C 19K
R7157	B C 19K
R7160	B C 19K
R7161	B C 19K
R7162	B C 19K
R7163	B C 19K
R7164	B C 20N
R7165	B C 17J

SWITCH	
S3001	A D 18C
S7001	A D 22B
S7002	A D 18B
S7003	A D 7B
S7004	A D 7B
S7005	A D 8B
S7006	A D 8B
S7009	A D 8B
S7010	A D 4B
S7011	A D 3B
S7012	A D 3B
S7013	A D 3B
S7014	A D 3B
S7016	A D 17B

TEST POINT	
TP108	A D 6P
TP111	A D 20E
TP2202	A D 20F
TP2263	A D 20D
TP3901	A D 11C
TP3902	A D 11D
TP3903	A D 11C
TP3904	A D 14E
TP3905	A D 14D
TP4001	A D 9F
TP7001	A D 9A
TPGND	A D 1O

OTHER	
CP3001	A D 9L
CP4001	A D 7O
CP4101	A D 7P
DI7001	A D 12A
FL1	A D 22P
FW7001	A D 14A
FW7002	A D 14A
K5101	A D 2O
K5102	A D 2O
PC5001	A D 11L
PC5101	A D 2L
PC5102	A D 2L
PC6101	A D 9K
PC6102	A D 9K
T2051	A D 11L
T5001	A D 2L
VA5001	A D 22P
VA5051	A D 1L
WH1	A D 14A
X1	A D 13L
X2	A D 13L
X3001	A D 13O
X3002	A D 14E

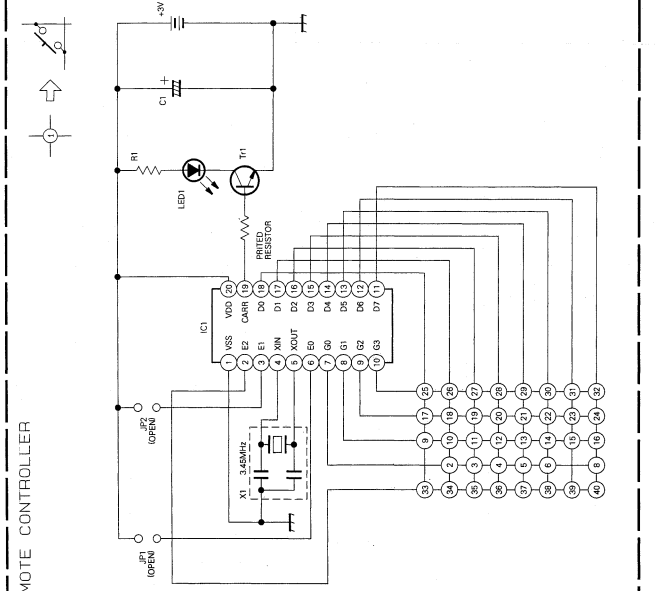
4.9 MAIN AND A/C HEAD CIRCUIT BOARDS



4.10 REMOTE CONTROL SCHEMATIC DIAGRAM [VR299/55]

NOTES:
1. All parts shown in this schematic are critical for safety.
2. This schematic is only for reference.
   Avoid replacing individual parts.
   Replace the entire unit only.

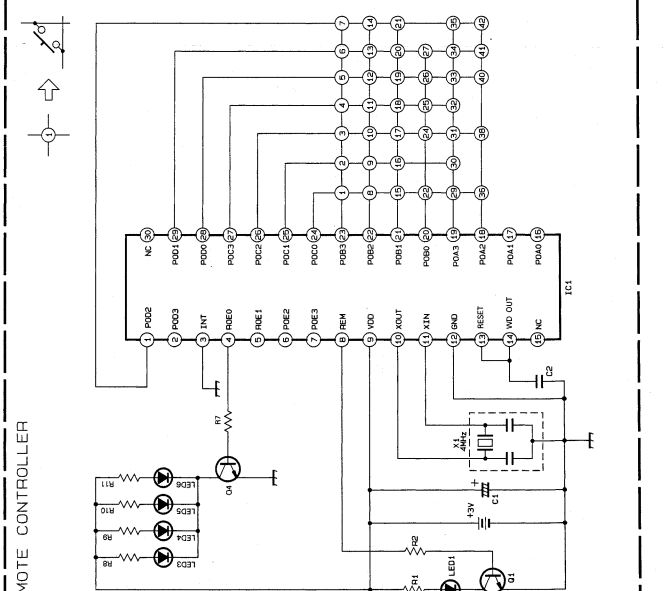
Key No.	Key Name
2	VCR/TV
3	CBL/DSS
4	TV
5	VCR
6	EJECT
8	POWER
9	2
10	5
11	8
12	0
13	STILL/SLOW
14	PLAY
15	MENU
16	TIMER
17	3
18	6
19	9
20	CLEAR
21	SLOW/FOWARD(+)
22	FF
23	CH+
24	CH-
25	SMART PICTURE
26	SKIP SEARCH
27	STOP
28	INDEX <<
29	REC/OTE
30	AUDIO/MUTE
31	INDEX >>
32	EXIT/STATUS
33	1
34	4
35	7
36	SPEED
37	SLOW/BACK(-)
38	REW
39	TV VOL+
40	TV VOL-



4.11 REMOTE CONTROL SCHEMATIC DIAGRAM [VR399/55]

NOTES:
1. All parts shown in this schematic are critical for safety.
2. This schematic is only for reference.
   Avoid replacing individual parts.
   Replace the entire unit only.

Key No.	Key Name
1	CBL/DSS
2	VCR/TV
3	1
4	4
5	7
6	SPEED
7	SLOW/BACK(-)
8	TV
9	POWER
10	2
11	5
12	8
13	0
14	STILL/SLOW
15	VCR
16	EJECT
17	3
18	6
19	9
20	CLEAR
21	SLOW/FOWARD(+)
22	REW(MINUS+)
24	TV VOL+
25	SKIP SEARCH
26	TV VOL-
27	SMART PICTURE
29	PLAY(MENU UP)
30	STOP(MENU DOWN)
31	FF
32	EXIT/STATUS
33	TIMER
34	INDEX <<
35	INDEX >>
36	CH+(PLUS+)
38	CH-
40	AUDIO/MUTE
41	REC/OTE



<ON SCREEN>

MODE PIN NO.	REC	PLAY
IC201		
1	0	0
2	2.7	2.7
3	5.1	5.1
4	-	-
5	-	-
6	2.5	2.5
7	2.5	2.5
8	5.1	5.1
9	3.2	3.2
10	4.6	4.6
11	3.7	0.9
12	5.1	5.1
13	2.3	2.3
14	0	0
15	2.3	2.3
16	0.4	1.0
17	5.1	5.1
18	2.9	2.9
19	-	-
20	-	-
21	5.1	5.1
22	3.7	3.7
23	5.1	5.1
24	5.1	5.1

<SYSCON>

MODE PIN NO.	REC	PLAY
IC3001		
1	2.9	2.6
2	0	0
3	2.0	2.5
4	2.6	2.6
5	-	-
6	2.6	2.6
7	2.5	2.5
8	2.6	2.6
9	5.1	5.1
10	5.1	5.1
11	0	0
12	-	-
13	0	2.0
14	5.0	5.0
15	5.0	5.0
16	-	-
17	-	-
18	-	-
19	-	-
20	4.7	4.7
21	-	-
22	4.3	0
23	0	0
24	5.0	5.0
25	0	0
26	5.2	5.2
27	5.2	5.2
28	5.1	5.1
29	5.1	5.1
30	-	-
31	-	-
32	0	0
33	-	-
34	-	-
35	0	0
36	0	0
37	-	-
38	5.1	5.1
39	0.3	0.3
40	0	0
41	5.2	5.2
42	4.7	4.7
43	0	0
44	5.0	5.0
45	5.1	5.1

MODE PIN NO.	REC	PLAY
46	-	-
47	-	-
48	-	-
49	5.0	5.0
50	5.0	5.0
51	5.2	5.2
52	3.6	0.9
53	4.6	4.6
54	-	-
55	-	-
56	0	0
57	0	0
58	0	0
59	-	-
60	0	0
61	0	0
62	0	0
63	0	0
64	-	-
65	-	-
66	-	-
67	-	-
68	0	0
69	-	-
70	5.1	5.1
71	5.1	5.1
72	5.0	5.0
73	5.1	5.1
74	5.1	5.1
75	4.3	4.3
76	4.4	4.4
77	-	-
78	-	-
79	-	-
80	0	0
81	-	-
82	5.1	5.1
83	-	-
84	0	0
85	-	-
86	-	-
87	5.1	0
88	-	-
89	-	-
90	-	-
91	3.1	3.1

MODE PIN NO.	REC	PLAY
92	5.1	5.1
93	5.1	5.1
94	-	-
95	-	-
96	-	-
97	5.1	0
98	0.3	0.3
99	-	-
100	-	-
101	2.5	2.5
102	1.3	1.3
103	-	-
104	-	-
105	0	5.1
106	-	-
107	0	0
108	1.6	1.6
109	5.1	5.1
110	0	0
111	0	0
112	2.6	2.6
IC3002		
1	5.1	5.1
2	5.1	5.1
3	0	0
IC3003		
1	0	0
2	0	0
3	0	0
4	0	0
5	4.4	4.4
6	4.4	4.4
7	0	0
8	5.2	5.2
IC3004		
1	0	0
2	12.5	12.5
3	0.2	0.2
4	-	-
5	0	0
6	12.5	12.5
7	0.3	0.3
8	12.5	12.5
9	0	0
Q3001		
E	0	0

MODE PIN NO.	REC	PLAY
C	12.5	12.5
B	0	0
Q3002		
E	0	0
C	5.0	5.0
Q3003		
E	0	0
C	5.0	5.0
Q3004		
E	0	0
C	0	0
B	0.7	0.7
Q3005		
E	5.1	5.1
C	5.9	5.9
B	5.8	5.8
Q4001		
E	0	0
C	0	0
B	5.0	5.0
CN3001		
1	12.4	12.4
2	0	0
3	1.4	1.4
4	0	0
5	1.6	1.6
CN3002		
1	0.1	0.1
2	0.1	0.1
CN3003		
1	0	0
2	2.5	2.5
3	2.5	2.5
4	5.1	5.1
5	0	0
6	5.1	5.1
7	-	-
8	12.4	12.4
CN3004		
1	5.2	5.2
2	5.2	5.2
3	0	0
4	0	0

<SW.REG>

MODE PIN NO.	REC	PLAY
IC5301		
1	6.0	6.0
2	5.1	5.1
3	4.8	4.8
4	0	0
5	12.4	12.4
6	11.8	11.8
7	12.5	12.5
8	12.5	12.5
9	1.3	1.3
10	11.2	11.2
Q5101		
S	-	-
D	150.0	-
G	-	-
Q5102		
E	0	0
C	-	-
B	-	-
Q5303		
E	5.3	5.3
C	6.0	6.0
B	5.9	5.9

<TUNER>

MODE PIN NO.	REC	PLAY
Q6030		
E	0.7	0.7
C	0	0
B	0	0
Q6031		
E	0	0
C	0	0
B	4.6	4.6
Q6032		
E	0	0
C	0	0
B	4.1	4.1

<TERMINAL>

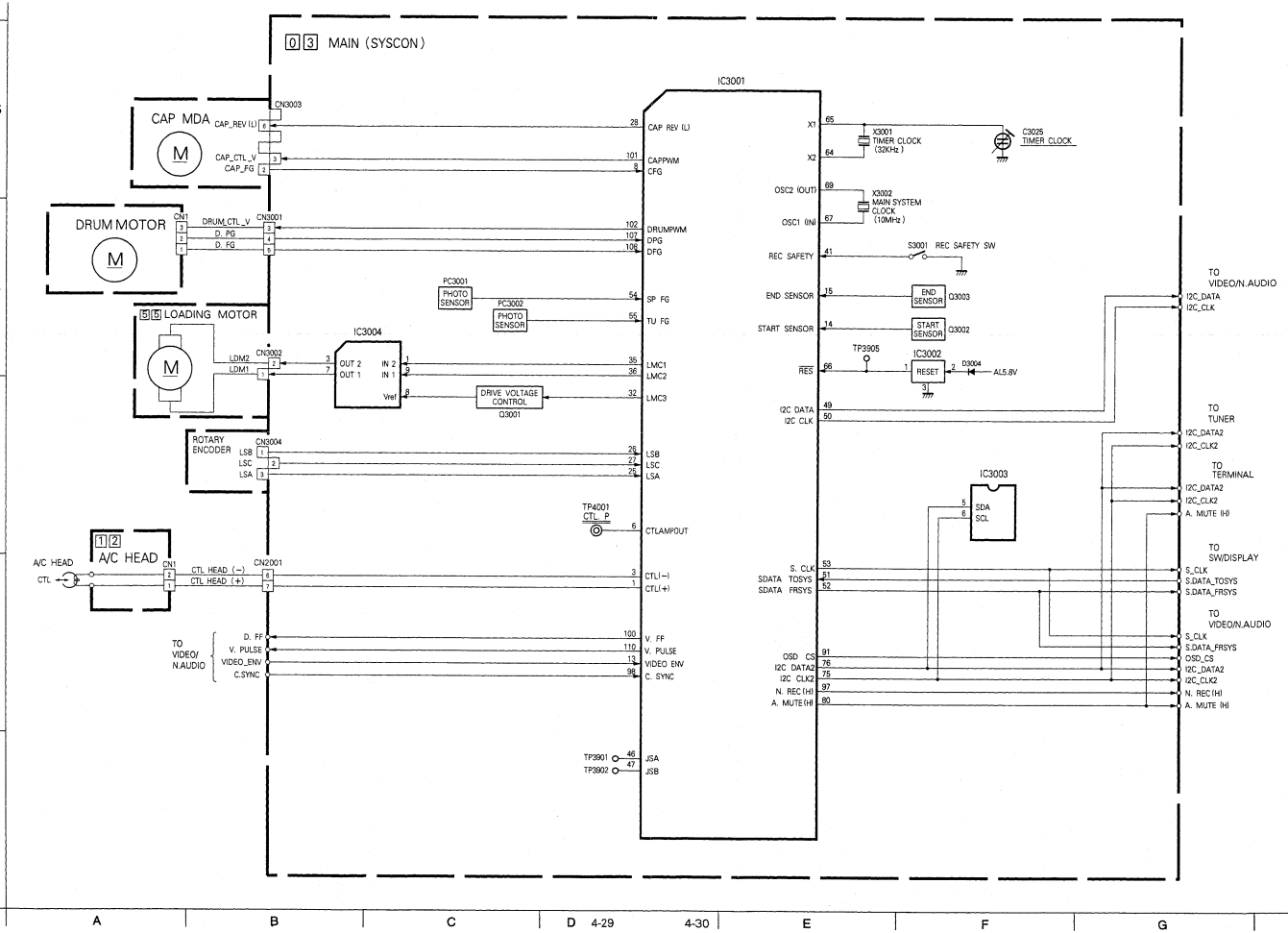
MODE PIN NO.	REC	PLAY
Q7101		
E	-	-
C	-	-
B	-	-
Q7102		
E	-	-
C	-	-
B	-	-
Q7151		
E	-	-
C	-	-
B	-	-
Q7152		
E	3.0	3.0
C	0	0
B	2.3	2.3

<SW/DISPLAY>

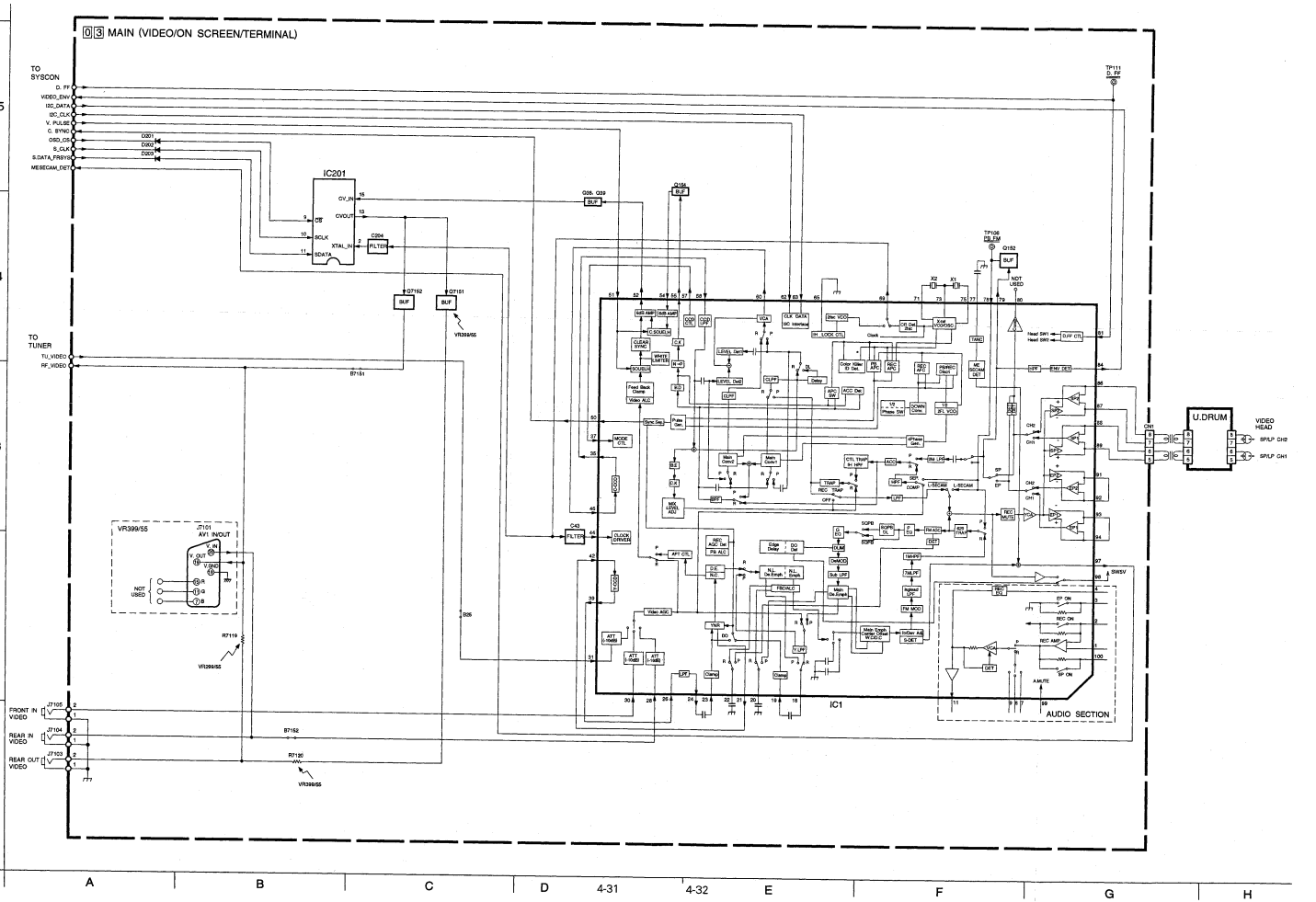
MODE PIN NO.	REC	PLAY
IC7001		
1	5.2	5.2
2	2.2	2.2
3	0	0
4	2.2	2.2
5	5.2	5.2
6	5.1	5.1
7	4.1	4.1
8	5.1	5.1
9	5.1	5.1
10	5.1	5.1
11	5.1	5.1
12	4.9	4.9
13	3.6	0.8
14	5.1	5.1
15	4.7	4.7
16	-29.6	-29.6
17	-29.6	-29.6
18	-29.4	-29.4
19	-29.4	-29.4
20	-29.4	-29.4
21	-25.0	-25.0
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-

MODE PIN NO.	REC	PLAY
40	-	-
41	-	-
42	-	-
43	-	-
44	5.2	5.2
IC7002		
1	5.1	5.1
2	5.1	5.1
3	0	0

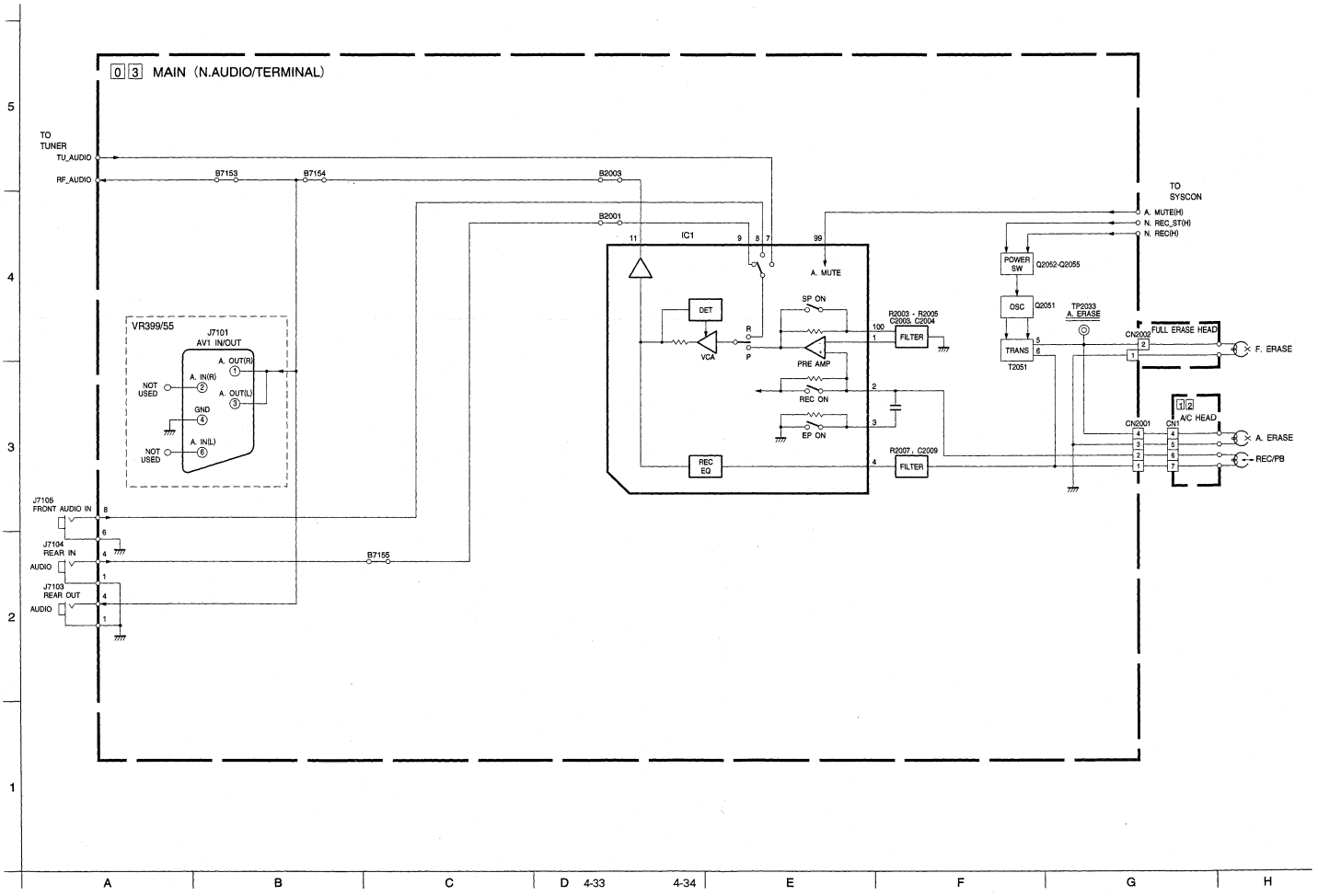
4.14 SYSTEM CONTROL BLOCK DIAGRAM



4.15 VIDEO BLOCK DIAGRAM

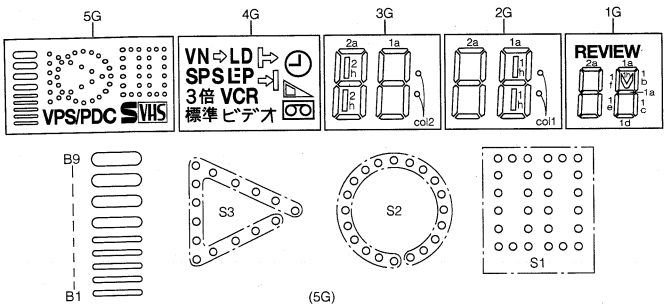


4.16 AUDIO BLOCK DIAGRAM



4.12 FDP GRID ASSIGNMENT AND ANODE CONNECTION

GRID ASSIGNMENT



ANODE CONNECTION

	5G	4G	3G	2G	1G
P 1	S2	⇨	1a	1a	1a
P 2	S1	⇨	1b	1b	1b
P 3	S3	3倍	1f	1f	1f
P 4	VPS/PDC	標準	1g	1g	1g
P 5	SVHS	🕘	1c	1c	1c
P 6	—	◺	1e	1e	1e
P 7	—	📼	1d	1d	1d
P 8	B9	VCR	col2	1h	1h
P 9	B8	ビデオ	2a	2a	2a
P10	B7	⇨	2b	2b	2b
P11	B6	VN	2f	2f	2f
P12	B5	LD	2g	2g	2g
P13	B4	SP	2c	2c	2c
P14	B3	S (SEP)	2e	2e	2e
P15	B2	: (SEP)	2d	2d	2d
P16	B1	LP (SEP)	2h	col1	REVIEW

4.13 VOLTAGE CHARTS

<VIDEO/N.AUDIO>

MODE PIN NO.	REC	PLAY
IC1		
1	2.5	2.5
2	2.5	2.5
3	0	0
4	2.2	2.5
5	0	0
6	2.8	2.8
7	2.5	2.5
8	2.5	2.5
9	2.5	2.5
10	2.5	2.5
11	2.5	2.5
12	5.0	5.0
13	1.9	1.5
14	1.9	1.5
15	2.6	3.0
16	1.5	0.8
17	0.3	0.7
18	2.3	2.3
19	3.0	3.0
20	2.8	2.8
21	2.3	2.3
22	1.9	2.1
23	3.0	3.0
24	2.1	2.1
25	1.4	1.4
26	2.1	2.1
27	0	0
28	2.8	2.8
29	1.9	1.9
30	2.8	2.8
31	2.8	2.8
32	0	0
33	0	0
34	0	0
35	3.1	3.1
36	5.1	5.1
37	0	0
38	5.1	5.1
39	3.3	3.3

MODE PIN NO.	REC	PLAY
40	5.1	5.1
41	5.1	5.1
42	2.0	2.0
43	5.1	5.1
44	2.6	2.6
45	0	0
46	2.0	2.0
47	0	0
48	0	0
49	0	0
50	0.4	0.4
51	0.1	0.1
52	2.3	2.3
53	2.8	2.8
54	2.0	2.0
55	2.1	2.1
56	2.3	2.3
57	0	0
58	3.1	3.1
59	2.8	2.8
60	2.1	2.1
61	5.0	5.0
62	5.1	5.1
63	5.0	5.0
64	0	0
65	1.1	2.3
66	5.0	5.0
67	5.0	5.0
68	0	0
69	2.8	2.8
70	2.6	2.6
71	-	-
72	2.3	2.3
73	-	-
74	2.6	1.0
75	-	-
76	2.3	2.3
77	4.7	4.7
78	2.7	2.7
79	4.4	2.0

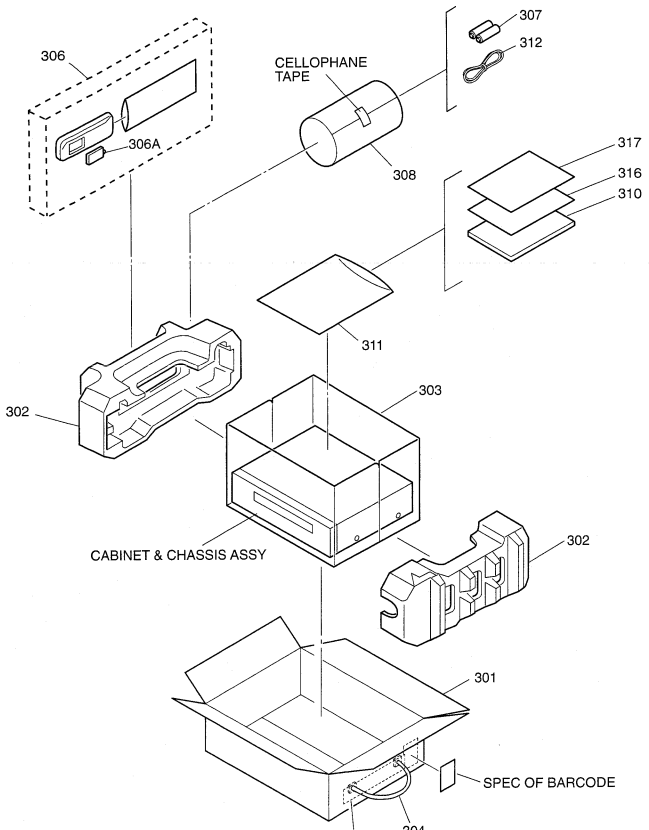
MODE PIN NO.	REC	PLAY
80	-	-
81	-	-
82	1.2	1.2
83	2.3	2.3
84	0	2.0
85	0	0
86	2.4	2.2
87	2.4	2.2
88	2.5	2.3
89	2.5	2.3
90	5.0	5.0
91	0	0
92	0	0
93	0	0
94	0	0
95	0.4	0.4
96	5.0	5.0
97	0	0
98	5.1	5.1
99	0.5	2.6
100	2.5	2.5
Q38		
E	1.7	1.7
C	5.0	5.0
B	2.3	2.3
Q39		
E	2.3	2.3
C	0	0
B	1.7	1.7
Q152		
E	5.0	2.7
C	0	0
B	4.4	2.0
Q154		
E	-	-
C	0	0
B	-	-
Q2001		
E	-12.7	0
C	0	0

MODE PIN NO.	REC	PLAY
B	-19.2	0.7
Q2002		
E	-12.7	0
C	0	0
B	-18.9	0.7
Q2003		
E	5.1	5.1
C	-19.0	5.0
B	5.0	0
Q2051		
E	0	0
C	8.2	0.2
B	0.5	0.2
Q2052		
E	11.8	11.8
C	11.6	0.6
B	11.0	11.7
Q2053		
E	0	0
C	0	11.7
B	5.0	0
Q2054		
E	11.6	0.6
C	11.4	0.1
B	10.8	0.6
Q2055		
E	0	0
C	0	0.6
B	5.0	0
CN1		
1	-	-
2	-	-
3	-	-
4	-	-
5	2.5	2.2
6	2.5	2.2
7	2.4	2.2
8	2.4	2.2
9	-	-
10	-	-

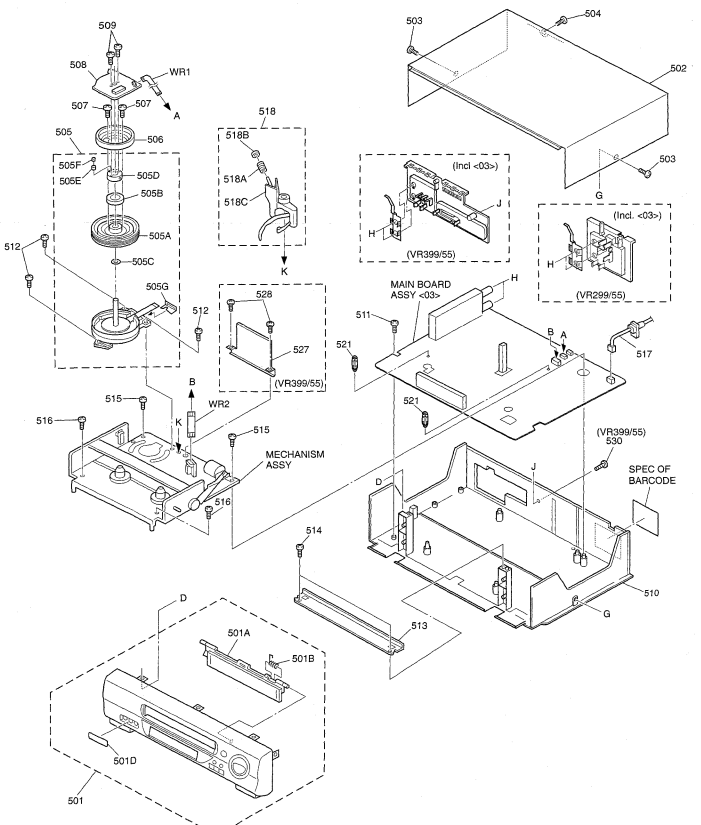
MODE PIN NO.	REC	PLAY
11	-	-
CN2001		
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	2.3	2.6
7	2.5	2.5
CN2002		
1	0	0
2	0	0

SECTION 5
PARTS LIST

5.1 PACKING AND ACCESSORY ASSEMBLY



5.2 CABINET AND CHASSIS ASSEMBLY



1. ACCESSORIES <M1>

306	996500000347	REMOTE CONTROLLER,VR299
306	996500000239	REMOTE CONTROLLER,VR399
306A	482244201904	COVER(BATTERY)
310	996500000354	INST BOOK(EN.CH.AR),VR299
310	996500000268	INST BOOK(EN.AR),VR399/55

2. CABINET AND CHASSIS ASSEMBLY <M2>

501	! 996500000270	FRONT PANEL ASSY,VR399/55
501	! 996500000355	FRONT PANEL ASSY,VR299/55
501A	482244311261	CASSETTE DOOR,VR299/55
501A	482244311254	CASSETTE DOOR,VR399/55
501B	482249242781	TORSION SPRING
505	996500000271	DRUM SUB ASSY
505A	482269110625	UPPER DRUM ASSY
505B	482246210924	CAP
505C	482253212804	WASHER
505D	482253212803	COLLAR ASSY
505E	482226511367	CONTACT
505F	482249211666	COMPRESSION SPRING
505G	482246812015	FPC PLATE
506	482236210293	ROTOR ASSY
508	482236210294	STATOR ASSY
518	482252811247	CLEANER ASSY
521	482240410961	PC SUPPORT,X2

WIRE

WR1	482232012426	FFC WIRE,DRUM CN3001
WR2	482232012468	E-CARD WIRE,A/C HEAD

! ... Safety component, use only this type.

R7130	MG RESISTOR 75Ω,1/10W
R7131	MG RESISTOR 75Ω,1/10W
R7132	MG RESISTOR 100Ω,1/10W
R7151	RESISTOR,VR399/55 330Ω,1/2W
R7152	RESISTOR 330Ω,1/2W
R7155	MG RESISTOR 330Ω,1/10W

CAPACITORS

C1	E CAPACITOR 10μF,16V
C7	E CAPACITOR 100μF,6.3V
C9	CAPACITOR 1μF,16V
C11	CAPACITOR 1μF,16V
C12	CAPACITOR 0.047μF,16V
C13	E CAPACITOR 3.3μF,50V
C14	CAPACITOR 0.033μF,25V
C16	CAPACITOR 1μF,16V
C20	E CAPACITOR 2.2μF,50V
C21	CAPACITOR 0.1μF,25V
C23	CAPACITOR 0.022μF,25V
C24	CAPACITOR 0.47μF,16V
C25	CAPACITOR 0.22μF,16V
C29	E CAPACITOR 4.7μF,25V
C31	MG RESISTOR 0Ω,1/10W
C32	CAPACITOR 0.01μF,50V
C34	CAPACITOR 0.1μF,25V
C37	E CAPACITOR 47μF,6.3V
C40	CAPACITOR 0.01μF,50V
C41	CAPACITOR 0.1μF,25V
C42	CAPACITOR 0.01μF,25V
C43	CAPACITOR 0.01μF,50V
C45	CAPACITOR 0.1μF,25V
C48	E CAPACITOR 47μF,6.3V
C49	CAPACITOR 330pF,50V
C51	NP E CAPACITOR 2.2μF,50V
C52	E CAPACITOR 1μF,50V
C53	E CAPACITOR 1μF,50V
C54	E CAPACITOR 2.2μF,50V
C55	E CAPACITOR 10μF,16V
C56	E CAPACITOR 3.3μF,50V
C57	CAPACITOR 0.1μF,25V
C58	CAPACITOR 0.1μF,25V
C59	CAPACITOR 0.1μF,25V
C60	CAPACITOR 0.1μF,25V
C61	CAPACITOR 33pF,50V
C62	CAPACITOR 0.1μF,25V
C63	CAPACITOR 150pF,50V
C64	E CAPACITOR 47μF,6.3V
C65	CAPACITOR 0.1μF,25V
C81	CAPACITOR 15pF,50V
C82	CAPACITOR 15pF,50V
C83	MG RESISTOR 0Ω,1/10W
C84	MG RESISTOR 0Ω,1/10W
C85	CAPACITOR 0.1μF,25V
C107	CAPACITOR 4pF,50V
C108	CAPACITOR 0.1μF,25V
C121	CAPACITOR 0.01μF,50V
C134	CAPACITOR 0.1μF,25V
C135	CAPACITOR 0.1μF,25V
C136	CAPACITOR 0.1μF,25V
C152	CAPACITOR 0.01μF,50V
C204	CAPACITOR 0.01μF,25V
C206	CAPACITOR 33pF,50V
C207	CAPACITOR 33pF,50V
C209	CAPACITOR 0.47μF,16V
C210	CAPACITOR 10pF,50V
C211	CAPACITOR 10pF,50V
C214	CAPACITOR 0.22μF,16V
C217	CAPACITOR 56pF,50V
C218	E CAPACITOR 1μF,50V
C222	E CAPACITOR 1μF,50V
C226	E CAPACITOR 100μF,6.3V
C2002	E CAPACITOR 47μF,16V
C2003	CAPACITOR 0.012μF,50V
C2004	E CAPACITOR 22μF,16V
C2005	CAPACITOR 0.001μF,50V
C2006	CAPACITOR 330pF,50V
C2007	E CAPACITOR 10μF,16V
C2008	CAPACITOR 0.0015μF,50V
C2009	E CAPACITOR 4.7μF,25V
C2010	E CAPACITOR 4.7μF,25V
C2011	CAPACITOR 0.033μF,25V
C2012	CAPACITOR 0.033μF,25V
C2013	CAPACITOR 0.033μF,25V
C2015	E CAPACITOR 22μF,16V
C2016	E CAPACITOR 4.7μF,25V
C2051	CAPACITOR 330pF,50V
C2052	F CAPACITOR 0.082μF,50V
C2053	CAPACITOR 0.0047μF,50V
C2054	CAPACITOR 0.022μF,50V
C2055	E CAPACITOR 10μF,16V
C3001	CAPACITOR 0.1μF,25V
C3002	CAPACITOR 0.01μF,50V
C3003	E CAPACITOR 10μF,50V
C3004	CAPACITOR 0.047μF,16V
C3011	E CAPACITOR 3300μF,6.3V
C3012	E CAPACITOR 100μF,6.3V
C3013	CAPACITOR 0.01μF,50V
C3014	E CAPACITOR 47μF,16V
C3016	CAPACITOR 0.047μF,16V
C3019	CAPACITOR 100pF,50V
C3020	CAPACITOR 100pF,50V
C3021	CAPACITOR 100pF,50V
C3022	CAPACITOR 0.047μF,16V
C3023	E CAPACITOR 10μF,16V
C3024	CAPACITOR 22pF,50V
C3025	482212511103 TRIM CAPACITOR
C3026	CAPACITOR 0.01μF,50V
C3027	E CAPACITOR 10μF,16V
C3028	CAPACITOR 100pF,50V
C3029	CAPACITOR 100pF,50V
C3030	E CAPACITOR 47μF,16V
C3031	CAPACITOR 0.047μF,16V
C3032	CAPACITOR 0.047μF,16V
C3033	CAPACITOR 0.047μF,16V
C3036	CAPACITOR 18pF,50V
C3037	CAPACITOR 12pF,50V
C3038	CAPACITOR 100pF,50V
C3039	CAPACITOR 100pF,50V
C3040	CAPACITOR 0.047μF,16V
C4001	E CAPACITOR 47μF,16V
C4002	CAPACITOR 0.047μF,16V
C4003	CAPACITOR 0.001μF,50V
C4004	E CAPACITOR 22μF,16V
C4005	CAPACITOR 0.0022μF,50V
C4006	E CAPACITOR 47μF,16V
C4008	NP E CAPACITOR 1μF,50V
C4009	CAPACITOR 0.056μF,50V
C4010	CAPACITOR 0.022μF,25V
C4011	CAPACITOR 0.1μF,16V
C4012	E CAPACITOR 0.22μF,50V
C4013	CAPACITOR 0.056μF,50V
C4014	CAPACITOR 100pF,50V
C4015	CAPACITOR 0.001μF,50V
IC5001	482212110675 F CAPACITOR 0.068μF,250V
IC5005	482212614039 CAPACITOR 0.0022μF,400V
C5006	E CAPACITOR 82μF,400V
C5101	CAPACITOR 0.0047μF,1kV
C5102	CAPACITOR 33pF,1kV

! ... Safety component, use only this type

C5104		E CAPACITOR 1μF,50V
C5105	482212170419	F CAPACITOR 0.018μF,50V
C5106		CAPACITOR 270pF,50V
C5107	482212143972	F CAPACITOR 0.1μF,50V
C5201		E CAPACITOR 220μF,6.3V
C5202		E CAPACITOR 820μF,16V
C5203		E CAPACITOR 680μF,10V
C5204		E CAPACITOR 4.7μF,100V
C5205		E CAPACITOR 10μF,50V
C5207		E CAPACITOR 220μF,16V
C5208		E CAPACITOR 220μF,10V
C5301		E CAPACITOR 220μF,6.3V
C5302		E CAPACITOR 10μF,50V
C5303		E CAPACITOR 100μF,16V
C5304	482212110554	F CAPACITOR 0.018μF,50V
C5305		CAPACITOR 0.01μF,50V
C5306		E CAPACITOR 100μF,10V
C5307		E CAPACITOR 22μF,16V
C6006		CAPACITOR 0.01μF,50V
C6008		CAPACITOR 0.01μF,50V
C6012		E CAPACITOR 47μF,16V
C6013		CAPACITOR 0.01μF,50V
C6014		CAPACITOR 0.01μF,50V
C6016		CAPACITOR 0.01μF,50V
C6020		CAPACITOR 100pF,50V
C6021		CAPACITOR 100pF,50V
C6022		CAPACITOR 100pF,50V
C6032		CAPACITOR 0.047μF,50V
C6037		E CAPACITOR 10μF,50V
C6052		CAPACITOR 100pF,50V
C6053		CAPACITOR 100pF,50V
C6055		CAPACITOR 22pF,50V
C7002		E CAPACITOR 10μF,50V
C7007		E CAPACITOR 47μF,6.3V
C7009		CAPACITOR 22pF,50V
C7010		CAPACITOR 0.047μF,16V
C7011		E CAPACITOR 47μF,16V
C7020		CAPACITOR 0.022μF,25V
C7021		CAPACITOR 0.047μF,16V
C7103		CAPACITOR,VR399/55 0.001μF,50V
C7104		CAPACITOR,VR399/55 0.001μF,50V
C7117		E CAPACITOR 470μF,6.3V
C7119		E CAPACITOR,VR399 470μF,6.3V
C7171		CAPACITOR 0.1μF,25V
C7172		E CAPACITOR 47μF,16V

COILS

L4	482215711354	COIL 10μH
L4	482215711354	COIL 10μH
L7	482215711615	COIL 0.22μH
L8	482215711284	COIL 100μH
L9	482215711354	COIL 10μH
L16	482215711354	COIL 10μH
L17	482215711515	COIL 12μH
L201	482215753302	COIL 1μH
L203	482215711288	COIL 22μH
L206	482215711288	COIL 22μH
L5201	482215711287	COIL 33μH
L5202	482215711287	COIL 33μH
L5301	482215711479	COIL 100μH
L6003	482215711354	COIL 10μH
L6031	482215753302	COIL 1μH
L7101	482205120008	MG RESISTOR,VR399/55
L7103		MG RESISTOR 0Ω,1/10
L7104		MG RESISTOR 0Ω,1/10

CRYSTALS

X1	996500000273	CRYSTAL RESONATOR
X2	482224210937	CRYSTAL RESONATOR
X3001	482224210938	CRYSTAL RESONATOR
X3002	996500000274	CRYSTAL RESONATOR

SWITCHES

S3001	482227613989	PUSH SWITCH,REC SAFE
S7001	482227614029	TACT SWITCH,POWER
S7002	482227614029	TACT SWITCH,PAUSE
S7004	482227614029	TACT SWITCH,CH-
S7006	482227614029	TACT SWITCH,OK
S7008	482227614029	TACT SWITCH,REC
S7010	482227614029	TACT SWITCH,MENU
S7011	482227614029	TACT SWITCH,CH+
S7012	482227614029	TACT SWITCH,STOP/EJE
S7013	482227614029	TACT SWITCH,REW
S7014	482227614029	TACT SWITCH,PLAY
S7015	482227614029	TACT SWITCH,FF V

PHOTO COUPLERS

PC3001	482213011171	GP3S123
PC3002	482213011171	GP3S123
PC5101 !	482213010431	PC123F2

TRANSFORMERS & TUNER

T2051	482214881344	OSC TRANSFORMER
T5001 !	482214611171	SW TRANSFORMER
TU6001	996500000275	TUNER

MISC

DI7001	482213011172	QLF0031-001
J7101	482226751504	RGB21PIN SOCKET,A/V
J7103	996500000324	PIN JACK,REAR OUT
J7104	996500000325	PIN JACK,REAR IN
J7105	996500000326	PIN JACK,FRONT IN
VA5001 !	482211713663	VARISTOR

CONNECTORS

CN1	996500000327	FPC CONNECTOR,(5-8)U
CN2001	482226511355	FPC CONNECTOR,(1-7)A
CN2002	482226511356	CONNECTOR,(1-2)FE HE
CN3001	482226511171	FPC CONNECTOR,(1-5)D
CN3002	482226511356	CONNECTOR,(1-2)L.MOT
CN3003	482226511621	CONNECTOR,(1-8)CAP.M
CN3004	482226511358	CONNECTOR,(1-4)R.ENC
CN5001 !	482226511371	CONNECTOR,(1-2)AC IN
CP3001 !	482220963612	ICP-N25
CP4001 !	532215753342	ICP-N15
CP5301 !	482220961685	ICP-N38

FUSE

F5001 !	482207032002	FUSE T2.0A

5. AUDIO CONTROL HEAD BOARD ASSY <12>

CONNECTOR

CN1	482226511361	FPC CONNECTOR

6. LOADING MOTOR BOARD ASSEMBLY <55>

CONNECTOR

CN1	482226511363	CONNECTOR

! ... Safety component, use only this type